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MINISTRY OF FORESTS

Fort Nelson Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective September 1, 2001

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Chief Forester

101-05364/

Table of Contents

Objective of this document 3
Description of the TSA 3
History of the AAC 4
New AAC determination 5
Information sources used in the AAC determination 5
Role and limitations of the technical information used 6
Statutory Framework 7
Guiding principles for AAC determinations 7
The role of the base case 9
    The base case for the Fort Nelson TSA 10
Consideration of factors as required by section 8 of the *Forest Act* 12
    Land Base Contributing to Timber Harvest 12
        - general comments 12
        - physical and economic operability 13
        - unmerchantable forest types, including sites with low timber productivity 14
        - black spruce-leading stands 16
        - lodgepole pine-leading stands 17
        - mixedwood stands 17
        - deciduous-leading stands 18
        - environmentally sensitive areas 19
        - roads, trails and landings 20
        - seismic lines and other oil and gas reductions 21
        - woodlot licenses 22
        - new protected areas 22
        - Agricultural Land Reserve 23
        - Cassiar addition 24
    Existing forest inventory 24
        - current inventory 24
        - volume estimates for existing natural stands 25
            1) Coniferous-leading stands 25
            2) Deciduous-leading stands 27
    Expected rate of growth 27
        - estimates for site productivity and regenerated stand volumes 27
        - minimum harvestable ages 29
        - regeneration delay 30
        - not-satisfactorily-restocked areas 30

Species conversions 31
- species change due to competition 31
- species conversion upon regeneration in mixedwoods 32
Silvicultural systems 33
Non-Commercial Brush (NCBr) conversions 33
Utilization standards 34
Decay, waste and breakage 35
Integrated resource management objectives 35
- cutblock adjacency, forest cover and green-up 36
- riparian habitat 37
- visually sensitive areas 38
- cultural heritage resources 39
- identified wildlife 39
- stand-level biodiversity 40
- landscape-level biodiversity 41
- Land and Resource Management Plan 44
Other First-Nations Issues 45
Alternative rates of harvest 45
Socio-economic analysis implications 47
Timber processing facilities 48
Pulpwood Agreement 14 49
Minister's letter and memorandum 50
Local objectives 50
Unsalvaged losses 51
Reasons for decision 53
Coniferous 53
Deciduous 56
Determination 58
Implementation 59
Appendix 1: Section 8 of the *Forest Act* 61
Appendix 2: Section 4 of the *Ministry of Forests Act* 63
Appendix 3: Minister of Forests' letter of July 28, 1994 63
Appendix 4: Minister of Forests' memo of February 26, 1996 63
Appendix 5: Summary of Public Information 63

Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination under Section 8 of the *Forest Act* of the allowable annual cut (AAC) for the Fort Nelson Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Fort Nelson Timber Supply Area encompasses an area of approximately 9.8 million hectares in the northeastern corner of B.C. This area includes approximately 1.5 million hectares recently transferred from the Bulkley - Cassiar Forest District, referred to as the Kechika Addition. The TSA is bounded on the south by the Mackenzie and Fort St. John Timber Supply Areas, on the west by the Cassiar-Stikine area and the Rocky Mountains, on the east by the Alberta border, and on the north by the Yukon/Northwest Territories border.

The topography forms a gradient of increasing relief from east to west. The area encompasses parts of the Alberta plateau, the Rocky Mountain Foothills, the Liard Plateau, and the Liard Plain. This entire region is within the Arctic watershed and is largely drained by the Liard River and its major tributaries, including the Fort Nelson, Prophet, Muskwa, Toad, Kechika and Petitot rivers. The Fort Nelson TSA contains a large portion of the Muskwa-Kechika Management Area. Management in this area is guided by the October 1997 Muskwa-Kechika Management Plan.

Communities in the Fort Nelson TSA include the town of Fort Nelson and smaller un-incorporated areas such as Prophet River, Toad River, and Muncho Lake. In 1996, the population of the Fort Nelson timber supply area was 6,127, which included 4,612 people living in the town of Fort Nelson. Between 1991 and 1996, the population in the timber supply area grew by over 18 per cent. This growth was attributable to increases in oil and gas exploration and new timber milling facilities.

The economy of the Fort Nelson TSA is dominated by forestry, public sector, oil/gas, and tourism. Trapping, agriculture, construction, public sectors, service industries and other small businesses employ the remainder of the labour force. The town of Fort Nelson is the major economic and employment centre for northeastern B.C.

Slocan Forest Products is the largest single forest industry employer in the TSA. The company expanded its operations in the TSA in 1996 when it opened an oriented-strand board mill. Another major employer in Fort Nelson's forest industry was the Canadian Chopstick Manufacturing Company Limited, which utilized some of the area's aspen timber and provided 30 to 40 person-years of direct harvesting and silviculture employment plus approximately 180 person-years of mill employment. However, as of April 1997, the Canadian Chopstick Manufacturing Company was permanently shut down.

The 14 parks, and 10 protected areas in the Fort Nelson Forest District provide wilderness experiences, scenic and wildlife viewing, water based activities, and other outdoor recreation opportunities. Tourism in the Fort Nelson timber supply area is a growing industry as the Alaska Highway is becoming increasingly popular for tourists destined for Alaska. The largest component of the tourism sector is the service industry: food, accommodation and trade. Tourists are also drawn to the area's guide outfitting and large-game hunting opportunities.

Four First Nations — Fort Nelson First Nation, Dene Tsaa Tse K'Nai First Nation, Dena Tha' First Nation and Halfway First Nation — are signatories to Treaty 8, which covers the Fort Nelson TSA. The Fort Liard First Nation, the Dene Tha' of Assumption, Alberta, the Kaska-Dena First Nation, and the Tahltan First Nation all have traditional territory in the timber supply area.

The TSA provides habitat for a diverse range of wildlife, including moose, elk, caribou, black bear, grizzly bear, stone sheep, goat, wolverine, wolf, small mammals and birds.

History of the AAC

In 1989, the AAC was set at 972 000 cubic metres, of which 750 000 cubic metres were attributed to coniferous-leading stands and 222 000 cubic metres were attributed to deciduous-leading stands. In 1994, the AAC was increased to 1 500 000 cubic metres, of which 600 000 cubic metres were partitioned under *Forest Act* provisions to coniferous-leading stands and 900 000 cubic metres were partitioned to deciduous-leading stands. The increase was due to the improved outlook regarding the economics of utilizing aspen.

The current AAC of 1 500 000 cubic metres is apportioned by the Minister of Forests as follows:

Apportionment	AAC (m^3/yr)	% of total AAC
Forest licences – replaceable	673 716	45.0
Forest licences - non-replaceable	129 384	8.6
Pulpwood agreements	610 000	40.7
Small Business Forest Enterprise Program - all categories	74 284	5.0
Forest Service Reserve	9 616	0.6
Woodlot licences	2 000	0.1
Total	**1 500 000**	**100.0**

The legislated 5-year period since the previous AAC determination for the Fort Nelson TSA has passed. I have delayed this determination because significant uncertainties in the inventory information used in the analysis came to light during the timber supply analysis process. Given the magnitude of these inventory issues, and the potential implications for the local forestry sector, I requested Ministry of Forests staff to investigate in more detail the links between inventory uncertainties and definition of the timber harvesting land base and management practices. The time required for these investigations led to a longer than normal analysis timeline, which resulted in a delay in the AAC determination. While the uncertainties have not been completely resolved, as I will discuss at various points in the following rationale, I believe the increased understanding both of those uncertainties and of the requirements for improving information have strengthened this determination, and will improve future decisions.

New AAC determination

Effective September 1, 2001, the new AAC for the Fort Nelson TSA will be 1 500 000 cubic metres, the same level as set in the previous 1994 determination. The AACs allocated to woodlot licences issued since the previous determination for the Fort Nelson TSA (2000 cubic metres) are not included in this new AAC for the TSA. Woodlot licences and their AACs are administered separately from the TSA. The full 1 500 000 cubic metres per year are attributable to the TSA.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

- *Fort Nelson TSA Timber Supply Analysis Report,* BCFS, June 1992.
- *Fort Nelson TSA Timber Supply Analysis Report Aspen Resource,* BCFS, July 1993.
- *Fort Nelson TSA Rationale for AAC Determination,* BCFS, February 1994.
- *Forest Practices Code of British Columbia Act,* July 1995.
- *Forest Practices Code of British Columbia Act Regulations and Amendments,* April 1996.
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and Ministry of Environment, Lands and Parks (MELP).
- *Fort Nelson Land and Resource Management Plan,* Fort Nelson LRMP Working Group, October 1997.
- *Fort Nelson Timber Supply Area (TSA) Data Package and Information Report,* British Columbia Forest Service (BCFS), July 1997.
- *Fort Nelson TSA Analysis Report,* BCFS, March 2000.
- *Fort Nelson TSA Public Discussion Paper,* BCFS, March 2000.

- *Fort Nelson TSA Summary of Public Input,* BCFS, July 2000.
- *Impacts of the Eastern Spruce Budworm in the Fort Nelson Region: An Update,* Canadian Forest Service (Shand and Alfaro), July 2000.
- *Fort Nelson Timber Supply Area Delivered Wood Cost Model – Final Report, Industrial Forestry Service Ltd., February, 1998*
- *Defoliator and beetle conditions in the Fort Nelson forest district. Forest Health Note #2 (Taylor), BCFS, October 1996*
- *Forest Susceptibility to Spruce Budworm Defoliation in the Fort Nelson Area of British Columbia, (Clowater), University of Victoria, 1992*
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives for the Province.
- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives for the Province regarding visual resources.
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC Determination Meeting held in Fort Nelson, August, 23-24, 2000.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Fort Nelson TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory Framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for timber supply areas and tree farm licenses. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code*.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time.

The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Code is now fully implemented following the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain. For example, implementation of Code provisions may require designations under the Act or regulations that have not yet been made by the specified statutory decision makers, or yet to be completed management regimes and related monitoring. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land use plans, the eventual timber supply impacts associated with land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions. However, where specific protected areas have been designated by legislation or by order-in-council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Fort Nelson TSA, government's approval in October 1997 of the Fort Nelson Land and Resource Management Plan, and decisions on protected areas have clarified many aspects of land and resource management for the TSA.

Forest Renewal BC funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will examine information on the types and extent of planned and implemented practices as well as relevant scientific,

empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture to see whether it is sufficiently certain to affect this determination.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent decisions in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Fort Nelson TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA, a timber supply analysis is carried out by BCFS staff using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM—'Forest Service Simulator'; in the case for the Fort Nelson TSA, 'version 3'), a series of timber supply forecasts is produced, reflecting different rates of change, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. Often termed the 'base case', this serves as a reference forecast, and forms the basis for comparison when assessing the implications of uncertainty for timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case are realistic and current, and the degree to which the resulting predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current, available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the *Forest Practices Code*, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

The base case for the Fort Nelson TSA

The base case as shown in the March 2000 *Fort Nelson TSA Analysis Report* incorporates several changes from the base case that was generated in the analysis used when making the 1994 AAC determination. In particular, the coniferous-leading land base is over twice the size of the area considered as the basis for the 1994 decision, which is mainly due to the inclusion of mixedwood stands. There is some uncertainty regarding this, which I have discussed in more detail below, and under *mixedwood stands*.

In the analysis, the timber supply was assessed separately for areas with coniferous-leading and deciduous-leading stands. The results suggest that based on current forest practices, a harvest of 1 376 000 cubic metres can be maintained from coniferous-leading stands over the long term. This harvest forecast is 2.3 times greater than the current harvest level set at 600 000 cubic metres for coniferous-leading stands. For deciduous-leading stands, the analysis indicates that an annual harvest of 900 000 cubic metres—the current deciduous harvest level—can be maintained over the long term.

The timber supply analysis examined the implications of two critical uncertainties: the potential contribution of black spruce stands, which were not included in the base case forecast; and the contribution of both coniferous- and deciduous-leading mixedwood stands, which were included in the base case forecast. I discuss these critical issues in more detail later in this rationale (under *black spruce-leading stands* and *mixedwood stands*).

With these and other critical factors incorporated, a base case forecast was generated and submitted for public review. The base case forecast showed that the current harvest level of 1 500 000 cubic metres could be increased to 2 276 000, and maintained for the long term. Several factors introduce significant uncertainty into the assessment of timber supply, particularly the quality of the forest inventory and the limited scope of timber harvesting in this very large TSA. However, the information and methods used in estimating the timber harvesting land base, growth and yield and management are the best available, and I am therefore satisfied that the base case projection provides a suitable point of reference for my assessment of the timber supply for this AAC determination. I examine the referenced uncertainties in the considerations below.

At several points in this rationale, I refer to the analytical basis for the 1994 determination. The 1994 rationale is not explicit about which analysis options and related land bases from the 1994 analyses were used for the determination. This issue is relevant particularly for the analysis of the coniferous land base, since several land base options were examined. The rationale does list the harvest forecasts assumed in the determination. The applicable land bases can be inferred from the harvest forecasts, and I have assumed that Option II from the *Fort Nelson TSA Timber Supply Analysis Report,* BCFS, June 1992 was the basis for the coniferous determination. For deciduous timber supply, the analysis (*For Nelson TSA Timber Supply Analysis Report Aspen Resource,* BCFS, July 1993) included only one scenario.

Consideration of factors as required by section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account
(i) the composition of the forest and its expected rate of growth on the area,

Land Base Contributing to Timber Harvest

- general comments

The total area of the Fort Nelson TSA, as estimated from BCFS inventory data reported in the March 2000 timber supply analysis, is 8 213 731 hectares. This does not include the 1.5 million hectares recently added to the Fort Nelson TSA from the Cassiar TSA. Of the total TSA area, 4 190 550 hectares (51 percent) are productive Crown forest land.

In defining the timber harvesting land base for a TSA, (i.e. the area estimated to be economically and biologically available for harvesting), a series of deductions are made from the total area of the productive forest. These deductions account for factors that effectively reduce the suitability or availability of the productive forest for economic, ecological or social (e.g. parks) reasons. In timber supply analysis, assumptions, and if necessary, projections must be made about these factors prior to quantifying appropriate areas to be deducted from the productive forest when deriving the timber harvesting land base.

For the Fort Nelson TSA base case, deductions were made from the productive forest to account for numerous factors including: natural disturbance; soil sensitivity; low timber productivity and value; riparian reserves; roads, trails and landings; wildlife tree patches; economic considerations; and others. The largest deductions are for low timber productivity and non-commercial cover (brush).

The resulting current timber harvesting land base – Crown land within the timber supply area that is currently considered feasible and economical for timber harvesting – was estimated as 924 857 hectares, 11 percent of the total TSA area. The deciduous timber harvesting land base was estimated as 402 171 hectares, roughly the same as that used for the last AAC determination in 1994. The estimated coniferous timber harvesting land base, at 522 686 hectares, is double that used in the 1994 determination. This change is due mostly to inclusion of more mixedwood stands (coniferous and deciduous trees in the same stand), lodgepole pine stands, and larger areas of more distant stands or stands of lower timber quality. The reasons for the changes will be evaluated in more detail in the following sections.

The long-term timber harvesting land base (885 602 hectares) is slightly smaller than the current timber harvesting land base because of reductions due to future roads.

- physical and economic operability

Those parts of the TSA which are not physically accessible for harvesting, or which are not feasible to harvest economically, are excluded in the derivation of the timber harvesting land base.

No operability mapping is currently available for the Fort Nelson TSA. For the base case, District staff used a delivered wood cost model developed by Industrial Forestry Service Ltd. to assess delivered wood cost based upon economic factors such as distance to mill, logging costs, road and bridge development and maintenance costs, amount of merchantable timber and other related criteria. This analysis was applied to individual inventory region/compartments in the TSA, and stands of timber in each entire region/compartment were considered either contributing or non-contributing.

Based upon the assessment, 114 357 hectares were deducted for economic reasons from the productive forest after all previous deductions. Additional reductions for unmerchantable types were applied in the analysis and will be discussed later in this rationale.

Further review by District staff done after completion of the analysis suggests that an additional 81 384 hectares (15.6 percent reduction) of coniferous-leading timber harvesting land base and 17 616 hectares (4.4 percent reduction) of deciduous-leading timber harvesting land base are isolated and lack past or planned harvesting, and therefore should also be considered as not contributing to the timber harvesting land base. These areas are in the Muskwa-Kechika Special Management Area, the area west of the Toad River (north to the border with the Yukon), and areas north of the Petitot River. Most of these additional areas did not contribute to the timber harvesting land base assumed for the 1994 determination. These assessments incorporated information that was not available to, or not used by the consultant who performed the initial delivered wood cost evaluation. This additional information was related primarily to difficult terrain and harvesting history.

In addition to the above, establishment of new parks within the TSA has the potential to restrict access to and therefore isolate approximately 2824 hectares of the base case timber harvesting land base. Alternate routes may be unavailable.

I have considered Slocan Forest Products' concern that "areas found to be uneconomical for harvesting today may not be so tomorrow and thus should not be removed from the timber harvesting land base." However, as stated in my "Guiding Principles," I do not believe good forest management would be served if I speculated on possible future economic trends, since doing so could place more pressure on more proximate and low cost areas. I therefore have not made any adjustments to the timber harvesting land base on account of this comment.

To conclude this section, the work done by District staff subsequent to the timber supply analysis highlights the sensitivity of the timber harvesting land base to uncertainties related to economic access. While the specific amount of area found to be uneconomic in the district assessment is subject to uncertainty, assuming that these areas are in the timber harvesting land base could place other areas at risk should the district assessment prove accurate in the future. In addition, the assessment used information highly relevant to determining economic access. I therefore believe this new information should be taken into account in my determination. For my determination, I assume that the base case overestimated the physically and economically operable coniferous timber harvesting land base by approximately 81 000 hectares and the physically and economically deciduous timber harvesting land base by approximately 18 000 hectares. An additional 2539 hectares (0.5 percent) of coniferous timber harvesting land base and 285 hectares (0.1 percent) of deciduous timber harvesting land base may also be isolated due to creation of recently established parks.

These factors indicate a potential reduction of the size of the timber harvesting land base of 16.1 percent for coniferous and 4.5 percent for deciduous. Sensitivity analyses undertaken for other factors suggest that, with similar magnitudes of uncertainty:

- decreasing the coniferous timber harvesting land base by 16.1 percent would decrease harvest level by about 17 percent; and
- decreasing the deciduous timber harvesting land base by 4.5 percent would not change harvest level in the short term, but would cause it to decline by 4 to 5 percent in the long term.

From this I am prepared to accept that the base case projection was based on a timber harvesting land base that was overestimated by 16.1 percent for coniferous and 4.5 percent for deciduous. I have accounted for this in my determination, as discussed in "Reasons for decision".

- unmerchantable forest types, including sites with low timber productivity

In the timber supply analysis, sites were excluded from the timber harvesting land base if they did not currently have a specified minimum volume per hectare, or would not be capable of producing a specified minimum timber volume within a specified time. The following site index (SI) thresholds were used to define these exclusions (SI is a standard measure of site productivity, and denotes the expected height of trees at a reference age of 50 years):

- Spruce (*Sx*): site index 10.8 (613 455 hectares of land base excluded)
- Lodgepole pine (*Pl*): site index 16.4 (663 181 hectares of land base excluded)
- Balsam (*B*): site index 10.7 (6 620 hectares of land base excluded)
- Aspen (*At*): site index 17.7 (607 609 hectares of land base excluded)

- Cottonwood (*Ac*): site index 14.0 (14 789 hectares of land base excluded)

Harvesting activity in coniferous stands has not occurred in stands with lower site indexes close to the above thresholds to nearly the same proportion that these stands contribute to the timber harvesting land base. Although harvesting can be demonstrated to this range of lower productivity conifer stands, this activity is generally associated with harvesting in adjacent, more productive stands. Sensitivity analysis showed that uncertainty in the site productivity threshold has a large effect on the coniferous land base. Thresholds at the lower end of the range of uncertainty (Sx 9.2, Pl 13.7, B 8.8) increased the coniferous timber harvesting land base by 31.4 percent, while thresholds at the upper end of the range (Sx 12.0, Pl 18.4, B 12.4) decreased the land base by 17.1 percent relative to the coniferous base case.

District staff indicate that while this factor is difficult to estimate with certainty, the higher site index estimates are likely a better reflection of merchantability thresholds than those used in the base case. Staff base this observation on a review of the average productivity of harvested areas within the TSA. I agree that estimating site index thresholds that reflect merchantability is difficult, and note the high sensitivity of the land base to changes in this factor. However, I note the relatively limited performance at the lower end of the productivity range assumed in the base case, and the high sensitivity of the land base to what I consider to be relatively small changes in the site index estimates (i.e., 2 metres or less). Therefore, at this time I consider it more likely that the upper end of the range tested in the sensitivity analysis provides a more reliable estimate of the land base that either currently contains or will likely produce merchantable timber.

In my determination therefore, as noted in "Reasons for decision", I have accounted for a potential overestimation of the coniferous timber harvesting land base of 17 percent. Since this area would include sites of less than average productivity, timber supply would be overestimated by somewhat less than 17 percent throughout the forecast period.

Site index cut-offs for deciduous stands - aspen and cottonwood - reflect current practice. Furthermore, it seems likely that aspen-leading sites with lower productivity than a site index of 17.7 could likely be utilized.

I am also aware that historic forest inventory procedures for assigning site index values to aspen stands within the TSA resulted in an area distribution by site index that is dominated by a few large spikes in certain productivity classes. I am advised that the spikes have resulted from an approximation site index based on site class, and that ongoing re-inventory efforts in the TSA will likely show a more even distribution of site productivity stands across the range of productivity classes, as would be expected in nature.

Reducing the aspen site index cutoff to include the volume 'spikes' in the inventory has a profound effect on deciduous timber supply. Lowering the aspen site index cutoff to 13.8 results in a 71 percent increase in the deciduous timber harvesting land base, while lowering aspen site index cutoff to 12.0 results in a 94 percent increase in the deciduous timber harvesting land base.

Analyses suggest that reducing deciduous site index cutoff to 12.0 would boost deciduous harvest levels from the base case 900 000 m^3/year to more than 1.3 million m^3/year.

These sensitivity analyses are helpful in understanding the importance of the site index threshold in defining the timber harvesting land base. However, I am still uncertain about what constitutes an appropriate site index cut-off for aspen. Given inventory quality, I am also uncertain about what additional volumes can be captured if the appropriate cut-off were lower. I am mindful that the sensitivity of the timber supply to small changes in the aspen site index cut-off is expected to change once the re-inventory is completed in the near future and more accurate site index estimates are available. For this determination, I will treat uncertainty about the site index threshold for aspen as an unquantified upward pressure on the deciduous timber supply. I will discuss this further under "Reasons for decision."

- black spruce-leading stands

Black spruce-leading stands did not contribute to the base case harvest forecast. A small amount of harvesting has occurred in black spruce-leading stands, but this is generally associated with activity in adjacent stands leading in other species (e.g., white spruce). Harvesting of black spruce has been neither significant nor proportional to the area of black spruce-leading stands within the TSA.

Black spruce-leading stands above the minimum productivity cut-offs for coniferous stands could potentially contribute an additional 248 580 hectares, increasing the conifer-leading timber harvesting land base by 47.6 percent. However, due to the standards and forest management conditions in place when the forest inventory was done, there is not a high degree of resolution in tree species labelling in stands, and there is likely a high degree of variation in within-stand productivity not reflected in the inventory.

Black spruce-leading stands within the Fort Nelson TSA often are associated with high water tables, small piece size, and ground considered operationally difficult based on demonstrated performance in the District.

There is significant uncertainty regarding the descriptions of spruce-leading stands in the inventory for the Fort Nelson TSA. Of the 435 613 hectares of spruce-leading stands within the timber harvesting land base, 289 093 hectares (66 percent) are labelled 'S' (not indicating white spruce - Sw - or black spruce - Sb). Some of these stands are actually black spruce, but the proportion of 'S'-labelled stands that are actually 'Sb' is unknown. District staff believe, based on examination of inventory data, that the portion that should be labelled Sb is likely small. In their public input however, Slocan Forest Products estimate that the portion of 'S' stands that are actually 'Sb' is significant, and that "the base case harvest level may be overestimated by 190 000 m^3/yr."

I am satisfied that the exclusion of black spruce leading-stands from the timber harvesting land base is based on the best available information and is adequate for use in this determination.

I also recognize that some unknown proportion of the spruce stands in the base case timber harvesting land base is actually black spruce and ought to be excluded. This is unquantifiable at present, and must await completion of better inventories. I have treated this as a downward pressure on the coniferous land base in "Reasons for decision".

- lodgepole pine-leading stands

The current coniferous AAC assumes a contribution of at least 80 000 m^3/yr from lodgepole pine-leading stands. The local licensee has demonstrated performance in these stands, but given the focus of existing mills on spruce and aspen, continued or increasing use of pine is somewhat uncertain.

Nevertheless, lodgepole pine-leading stands form a significant portion of the coniferous timber harvesting land base in this TSA (13.2%). Pine-leading stands contribute 220 000 m^3/yr, or about 16%, to the coniferous base case over the long-term. Even with an increased site index cut-off (18.4) pine-leading stands contribute a long-term harvest level of 148 000 m^3/yr. To justify the continued contribution of lodgepole pine-leading stands to the timber harvesting land base, these stands must continue to contribute to the harvest.

Therefore, my determination is premised on continued harvesting in lodgepole pine-leading types in approximate proportion to their expected contribution to the timber harvesting land base. However, given uncertainties related to the land base and inventory, I will not specify a particular amount for lodgepole pine. The actual harvest from lodgepole pine stands should be monitored so that the level of their contribution to the timber harvesting land base and timber supply can be reassessed in future determinations. I discuss the contribution of lodgepole pine under "Implementation."

- mixedwood stands

Coniferous-leading and deciduous-leading mixedwood stands comprise substantial components of the timber harvesting land base (33.5 percent of the total, 19.8 percent of coniferous-leading, 13.7 percent of deciduous-leading). Some uncertainty surrounds the accuracy of these numbers due to the age of the forest inventory and the standard to which it was collected.

Although the history of operations in mixedwood stands is brief (since the last AAC determination), there has been demonstrated harvesting activity in these stands.

Currently the District is operating under interim mixedwood management guidelines. Uncertainty exists about the appropriate silviculture regime for these stands in terms of the species composition of the regenerated stands. This issue is discussed further in this rationale under "Species conversions."

In the analysis, all volume in mixedwood stands contributes to the timber supply forecast for the leading species; that is, the deciduous component of coniferous-leading mixedwood stands contributes to the coniferous forecast. Similarly, all volume in deciduous-leading stands contributes to the deciduous forecast. According to available inventory information,

approximately 13 percent of the coniferous harvest flow is deciduous (272 880 m^3/yr), and 13.7 percent of the deciduous harvest flow is coniferous (123 300 m^3/yr). The percentage contributions of these minor components are highly uncertain given the age and quality of the inventory. Further, cut control administration is consistent with the analysis; that is, all volume in a mixedwood stand is billed to either the coniferous or deciduous portion of the allowable cut depending on the leading species. Hence, no adjustment of the base case projections is required on account of this issue.

Mixedwood stands in this TSA have significant wildlife and biodiversity values, as noted by the Ministry of Environment, Lands and Parks (MELP) in its submission. MELP recommends that all mixedwood stands — deciduous and coniferous — be removed from the base case and possibly be partitioned in this determination. In my determination, I am retaining the mixedwood stands in the base case. This reflects current practice. Wildlife and biodiversity concerns should largely be addressed through application of the *Landscape Unit Planning Guide* and Identified Wildlife Management Strategy.

District management strategies for mixedwood stands, currently under development, should take into account the significant wildlife and biodiversity values of these stands. I will return to this issue later in my determination.

- deciduous-leading stands

Aspen-leading stands comprise 354 197 hectares (88 percent) of the current deciduous timber harvesting land base in the base case. A review of performance done by district staff indicates that it is reasonable to expect that harvesting will occur on this area. Furthermore, as discussed under *unmerchantable forest types,* this area might even be underestimated.

Cottonwood-leading stands comprise 12 percent (48 000 ha) of the current deciduous timber harvesting land base. Recently, the holder of the cottonwood license has not been targeting cottonwood-leading stands. The majority of cottonwood processed at local facilities has been harvested as minor components of other stands (e.g., aspen leading). When encountered within blocks, oriented strand board (OSB)-grade cottonwood has been either left on site to contribute to waste and residue volumes, or left standing. This could imply that considering current market conditions, the base case harvest forecast may overestimate the deciduous land base. However, as market conditions change, it is likely that currently uneconomic stands will once again become merchantable for harvest.

I am satisfied that the aspen and cottonwood inventories on which the timber supply analysis was based represent the best available information and are adequate for use in this determination, subject to considerations in other areas of this document.

Birch-leading stands did not contribute to the base case harvest forecast. Birch did contribute to the base case harvest forecast when it occurred as a minor component of other stands. However, there has been some recent interest in the processing of birch in the TSA. In addition, recent improvements to local processing facilities will allow for the inclusion of a birch component into the production of OSB. A preliminary assessment indicates that birch-leading stands with a site index greater than 17.0 could be marketable. The TSA

inventory indicates that 29 633 hectares of birch leading stands meet the merchantability requirements. There is, however, significant uncertainty surrounding the birch inventory.

Additional issues that will influence the potential harvest of birch-leading stands include:

- First Nations use of birch;
- a lack of infrastructure allowing access to birch stands;
- limited birch markets in Fort Nelson; and
- a lack of the quality of birch required for higher value products.

There is clearly an emerging demand for utilizing some birch-leading stands. Upon review of the spatial distribution of the potentially contributing birch land base and the associated constraints and issues, District staff estimate that about 3000 hectares (10 percent of the total identified as potentially merchantable) are actually merchantable. These 3000 hectares could support a birch harvest level of approximately 6000 m^3/yr. I also note that the inventory indicates that birch-leading stand cover a total of over 170 000 hectares. The noted 3000 hectares that have been evaluated as merchantable therefore constitute about 2% of the total area of birch-leading stands. Excluding 90 percent of birch-leading stands from the timber harvesting land base and 98% of the total area of such stands should allow sufficient volumes to be made available to address First Nations needs.

In my determination therefore, as noted in "Reasons for decision", I have accounted for an underestimation of 3000 hectares in the deciduous timber harvesting land base used in the base case projection due to the potential for harvesting in birch-leading stands.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area identified during a forest inventory that is sensitive to disturbance (such as unstable terrain, or difficult to reforest) and/or is significantly valuable for fisheries, wildlife, water or recreation resources. ESA values are used to exclude areas from the timber harvesting land base where more specific and detailed information is not available about a specific forest resource. ESAs for the Fort Nelson TSA were originally established by MoF staff in collaboration with specialists from MELP in 1976; they were revised in 1989.

Avalanche areas (Ea), moderate regeneration problem areas (Ep2), high regeneration problem areas (Ep1), high recreation sensitivity areas (Er1), high soil sensitivity areas (Es1), high wildlife sensitivity areas (Ew1), significant caribou habitat areas (Ew2c) and significant goat habitat areas (Ew2g) were all 100 percent excluded.

Much of the area classified as ESA was deducted previously in the reductions for low site productivity and riparian reserves.

I have considered Slocan Forest Products' comment that "ESA2 reductions should not be 100 percent." I note that ESA2 reductions comprise less than one-tenth of one percent of the timber harvesting land base. While I acknowledge the true level of reduction may be uncertain, the values and sensitivities represented by these ESA2s are important, and some level of reduction would be appropriate. Given that a very small area is involved, the percentage reduction is uncertain, and current ESA mapping is the best information available, I conclude that the base case harvest forecast appropriately considers ESAs and that no adjustments are required on this account.

- roads, trails and landings

During timber supply analysis, a percentage of the productive forest otherwise considered available for harvesting is excluded to account for the construction of logging roads, trails and landings.

Existing roads: District staff estimate that unclassified roads, trails, landings, and dispersed disturbance due to harvesting activity cover about 4 percent of the currently accessed timber harvesting land base. Therefore, a 4 percent reduction was applied to stands 40 years or younger based upon the assumption that the majority of harvesting has taken place in the last 40 years. A total of 4559 hectares were removed from the timber harvesting land base to account for existing roads, trails and landings.

The Fort Nelson First Nation disagree with the statement in the analysis report that "virtually no open-roaded access presently exists in the TSA" since forestry and oil and gas companies use all weather and fair weather roads." This comment relates to the potential impacts of human access into areas of wildlife habitat. This objection is noted, and I acknowledge that interaction between people and wildlife is an important forest management issue. I note that access was addressed in the LRMP. Further, District staff inform me that 80 to 90 percent of forest operations are in winter. The method used to estimate the area of roads for the analysis recognizes the differences in impacts of all-season *versus* winter roads. Considering the above, I believe the area of existing roads, trails and landings was estimated appropriately.

I consider the base case assumptions to be a reasonable approximation of the productive forest area that should be removed from the timber harvesting land base to reflect existing roads in the Fort Nelson TSA.

Future roads: To account for future roads, trails, and landings a portion of the timber harvesting land base is not considered to contribute to further timber production after it is harvested for the first time. Based on a review of silvicultural prescriptions, Fort Nelson District staff estimated these losses to be 5 percent. This reduction was applied to stands older than 40 years after their first projected harvest.

Slocan Forest Products note that "District policy requires the licensee to reforest all temporary roads and landings. This means roads are not permanently removed from the timber harvesting land base and therefore need to be included as operable land base in

the analysis." I acknowledge that rehabilitation of temporary roads and landings will likely reduce the area that should be excluded from the timber harvesting land base. Nevertheless, post-rehabilitation productivity is uncertain, and the timber supply effects, if any, will occur over the long-term. The methods and information used in the analysis for future roads, trails, and landings are satisfactory for use in this determination. I trust that the issues raised here will be examined prior to the next determination for this TSA.

- seismic lines and other oil and gas reductions

An extensive oil and gas exploration and development industry is operating throughout the Fort Nelson TSA with activity primarily concentrated in areas outside of the mountainous portions of the TSA.

The current forest cover inventory contains information on seismic lines and some other oil and gas activity up to 1994. For the timber supply analysis, a geographic information system (GIS) was used to draw buffers along the lines to represent their width on the ground. An additional area calculation was made to estimate reductions to the timber harvesting land base. As a result, a total of 14 396 hectares were removed from the timber harvesting land base. This deduction represents 0.3 percent of the total productive forest and about 1.6 percent of the base case timber harvesting land base for the TSA.

Due to the uncertainty related to the amount and location of future oil and gas programs, it was impossible to estimate their potential impact on the timber harvesting land base. Therefore, no future reductions were assumed in the analysis, so the amount of seismic area remained static throughout the forecast period.

Slocan Forest Products notes that District policy requires the licensee to reforest any seismic lines that fall within the bounds of the harvested area. In such cases, the area does not become lost to future timber production. District staff inform me that licensees are required to reforest such seismic lines. However, both the proportion of the total area of seismic lines that are included in harvest blocks, and the extent to which these lines might be re-used in the future (which would reduce productivity of any re-forestation) are unknown. Nevertheless, it appears that the reductions used in the base case overestimate area actually removed from the timber harvesting land base to an unknown extent on account of these reforestation requirements.

In addition to areas already accounted for in the analysis, 2769 hectares of total area have been developed by the oil and gas industry (two operating years). Using the same ratio applied to the total seismic area in the buffering exercise, the net area is approximately 570 hectares of timber harvesting land base.

Future oil and gas activity will include additional seismic lines, lease sites, burrow pits and sumps, pipelines, and camps. These potential future reductions to the timber harvesting land base were not considered in the analysis. Although often rehabilitated ("rolled back", recontoured, and seeded), virtually no areas are re-forested or subject to silviculture treatments by oil and gas companies on seismic lines, pipelines, lease site, burrow pits, or

sumps. I acknowledge that rehabilitation may act to decrease the overall area of seismic-related disturbance. However, the degree to which such activities will be offset by new disturbances or by re-activation of previous disturbances is unknown. Furthermore, information provided by staff suggests that rehabilitation does not mean reforestation in this context. Given the relatively small areas and the uncertainties involved, I believe that these issues are best addressed by incorporating new information, as it becomes available, into future timber supply reviews.

In conclusion, I am aware of a small 570-hectare overestimate of the timber harvesting land base on account of recent activity that was not in the base case data, and an unquantified underestimate of the timber harvesting land base due to reforestation requirements for in-block seismic lines. The 570-hectare over-estimate is more certain and likely larger than the under-estimate due to reforestation. Nevertheless, the magnitudes of areas are very small in relation to the TSA and the other uncertainties and necessary adjustments to the base case. In this context, my determination would not be affected whether I accepted the base case information with respect to seismic areas, or made the very small, but uncertain, adjustments suggested by the new information. Therefore, to simplify the discussion of the most important reasons behind my determination, I will make no adjustments on account of this factor. The area within seismic-related disturbance, and the management of these areas should be monitored to improve information for future determinations.

- woodlot licenses

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. Thus, when woodlot licences are issued in a TSA, the required volumes are first allocated from an appropriate apportionment under the AAC for the TSA. Then, in the next AAC determination for the TSA, the TSA land base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination, and the total volume in the issued woodlot licences is excluded from the AAC for the TSA.

The base case timber harvesting land base does not exclude two recently issued woodlots within the TSA. These woodlots encompass approximately 1200 hectares of the TSA with a total AAC of 2000 m^3/yr (1600 m^3/yr coniferous, 400 m^3/yr deciduous). Together, they represent less than 0.13 percent of a reduction to the current timber harvesting land base.

I accept that the base case projection was based on a timber harvesting land base that was overestimated by 1200 hectares since it included allocated woodlot licenses. I have accounted for this in my determination, as discussed in "Reasons for decision".

- new protected areas

As a result of the approved Land and Resource Management Plan for the Fort Nelson District, 750 945 hectares of new parks were designated in June of 1999.

When the analysis was undertaken, some of the currently designated park areas were still proposals, and, therefore, the impact of removing those areas was examined in sensitivity

analysis. The total THLB in the proposals was 17 896 hectares (10 792 hectares conifer and 7103 hectares deciduous), which sensitivity analysis showed contributed 29 000 m^3/yr and 16 000 m^3/yr to the coniferous and deciduous harvest flows, respectively.

On January 26, 2001 all remaining proposed protected areas received official designation. The designated areas cover an estimated 16 800 hectares or 1.9% of the timber harvesting land base (2.1% of the coniferous and 1.8% of the deciduous land base).

The areas that were examined in the sensitivity analysis, then, closely approximate the total of the designated protected areas.

The Denetiah Corridor (7441 ha), which is within the area transferred to the Fort Nelson TSA from the Cassiar TSA, was designated as a new protected area in July 2000. This area was not included in the Fort Nelson TSA for the timber supply analysis. I discuss this area below under *Cassiar addition*.

In my determination, I have accounted for an overestimation of approximately 2.1 percent of the coniferous timber harvesting land base and 1.8 percent of the deciduous timber harvesting land base used in the base case projection, as noted in "Reasons for decision". These impacts are based on information from the analysis approximating the timber supply impacts of what are now declared protected areas.

- Agricultural Land Reserve

Currently, the inventory file indicates that 49 986 hectares are classified as Agricultural Land Reserve (ALR). ALR area that has been converted to private land or that is currently under lease does not contribute to the timber harvesting land base. In the analysis, this area has been excluded from the area managed by the Ministry of Forests.

In the base case, about 19 844 hectares of ALR land contribute to the timber harvesting land base (2.2 percent of the long term timber harvesting land base). This represents 3.4 percent of the deciduous-leading land base and 1.1 percent of the coniferous-leading land base. This area has neither been converted to private land, nor is it currently under lease.

While designation as ALR may preclude long-term timber production, it does not necessarily preclude harvesting of the timber currently on the sites, nor does it necessarily mean that the status of the land will change in the future (that is, that the land will actually be sold or leased to a non-forest use). Given the current uncertainty about the long-term status of the ALR areas that contributed to the base case timber harvesting land base, and the potential for the associated timber to contribute to timber supply over the next several decades, I believe it was appropriate to include the non-private and non-leased ALR land in the timber harvesting land base. Any status changes can be incorporated into future determinations.

- Cassiar addition

The Fort Nelson District boundary has been amended, adding about 1.5 million hectares that was previously part of the Cassiar TSA. The area added to the district is remote and does not have any timber harvesting history or plans for harvesting. Analysis using the same criteria for defining the timber harvesting land base as used in the base case indicates that 19 858 hectares could potentially be eligible for harvesting. However, until this area is examined more closely, its actual operability remains uncertain.

The base case timber harvesting land base did not include the Cassiar addition. As the additional area is remote and not expected to contribute to timber supply over the next several years, I conclude that it is appropriate that the Cassiar addition does not contribute at this time.

Fort Nelson First Nation noted that the Cassiar addition does not compensate for the infringement of disturbance related to the existing harvest rate on Treaty 8 rights, and should not be used to justify an increase in harvesting. As noted, I am assuming that the Cassiar addition area does not contribute to the Fort Nelson TSA timber supply for this determination.

Existing forest inventory

- current inventory

The current forest inventory for the Fort Nelson TSA ranges in vintage from 1970 to 1989 (30 to 11 years old). Since 1980, inventory standards in BC have changed, meaning the older inventory information for the Fort Nelson TSA was collected using methods that are below the current acceptable standard. Further, in many cases, the photos used as the basis for this inventory information are even older than the inventory year and taken to a standard not acceptable by current practice.

UNIT	INVENTORY YEAR	YEAR OF PHOTOS
Liard (38 percent)[1]	1989 (27 percent)[2]	1988
	1973 (49 percent)[2]	1950[3]
	1972 (24 percent)[2]	1972
Kotcho(27 percent)[1]	1970	1966 - 67
Fort Nelson (24 percent)[1]	1980	1979
Sikanni(12 percent)[1]	1971	1971

1) Approximate percentage of the TSA
2) Approximate percentage of the unit area
3) Air Force photos - exact date flown is unknown but it is suspected that it is between 1948 and 1953.

The Ministry of Forests, in partnership with Slocan Forest Products, has developed and is implementing a 5-year re-inventory project for the TSA (currently entering year 3). Photo-interpreted (phase I) re-inventory has been completed recently on over 1.8 million hectares. An additional 867 000 hectares is scheduled for completion by March 31, 2002. Inventory adjustments (phase II) are scheduled for the last two years of this planned project.

District staff believe the most significant issues related to the existing older forest inventory are:

- broad polygon typing,
- incorrect species labelling,
- incorrect site productivity (site index) estimates,
- under-representation of understory, and
- misrepresentation of mixedwoods.

In their submissions, the B.C. Ministry of Environment Lands and Parks (MELP), Fort Nelson Regional Economic Task Force, Slocan Forest Products, Northern Rockies Regional District and Town of Fort Nelson all emphasized the importance of updating and upgrading current inventories for the TSA. In addition, MELP questioned whether the existing inventory provided a true reflection of the area of mixedwood in the TSA.

The current forest inventory represents the best information available for use in the TSR process. However, due to the vintage of some portions of the current inventory and the associated uncertainties, and known inaccuracies of the inventory, it is necessary to interpret the base case forecast with some caution. In relevant sections of this rationale, I have considered how the nature and age of the inventory affects the certainty of the base case timber supply forecast, and have described related upward and downward pressures on that forecast. Improved inventory will be critical in reducing uncertainty in future determinations.

- volume estimates for existing natural stands

The Variable Density Yield Prediction model (VDYP) was used to develop estimates of stand volume for all existing stands, and future deciduous, mixedwood, spruce/larch and balsam stands.

The results of the analysis indicated that the harvested volumes from existing stands (first 11 decades of the harvest forecast) average from 341-369 m^3/hectare for coniferous and 290-313 m^3/hectare for deciduous stands.

1) Coniferous-leading stands

District staff assert that VDYP does not account for declining volumes within stands as they age past maturity. Stands are projected to continue to maintain and sometimes

accumulate volume until they are projected for harvest. Given the current abundance of older age classes (78 percent of the timber harvesting land base is covered with stands at or above the minimum harvesting age) the lack of accounting for potential volume loss in stand yield predictions may have resulted in an overestimate of the projected estimated stand volumes at harvest. Slocan Forest Products also notes that VDYP yield curves show continued positive growth after 180 years, and claim that conifer stands in the boreal forest start to show stagnation at 180 years and volume reduction due to reduced vigour and increased susceptibility to insects and disease.

I acknowledge District observations that mature stands are subject to factors such as non-catastrophic blow down, disease, and other forms of mortality. The majority of this decline has been noted in coniferous-leading stands, but it is also present in some deciduous-leading stands. No work has been done to date to quantify the impacts of this decline. I also acknowledge that forest stands are unlikely to accumulate volume in perpetuity, at least for the same tree species. However, it is unknown to what degree declining volumes of one species may be offset by increasing volumes in another species, with the overall result potentially being maintenance of, or increase in volume. I must also note that VDYP is based on a large number of samples throughout the province, including from areas in the north-east. The issue of stand decline has arisen in other areas of the province, and I am aware of little information on the degree to which volumes change as stands age over the long term. Due to these uncertainties, I cannot reasonably make any adjustments in this rationale on account of this issue.

In a comparison of harvested volumes projected in the analysis with actual harvested volumes, Slocan notes that the average harvested volume projected for conifer stands (approximately 350 m^3/hectare) is significantly greater than operational experience. Slocan Forest Products' average volume for coniferous-leading stands is 225 m^3/hectare, 36 percent lower than in the analysis. If applied on a proportional basis to the entire forecast, this factor alone would reduce the coniferous base case forecast by approximately 488 000 m^3/yr.

A sensitivity analysis indicated that if existing stand volumes are overestimated by 10 percent, the initial coniferous harvest level would be 90 000 m^3 (6.5 percent) lower than the base case and would increase to the base case long-term harvest level in 160 years when all stands are assumed to be regenerated managed stands. No sensitivity analyses were undertaken to examine the potential impact of a 30-35 percent overestimate.

No complete and statistically valid inventory audit information is available for the Fort Nelson TSA to provide a frame for evaluation of any of the more informal comparisons referenced above.

Although the average volumes in existing conifer stands are uncertain, there is evidence that modelled volumes considerably overestimate the actual volumes. I understand the limitations of comparing yield model projections with cruise, scale, and billing information, as was done by Slocan; that is, uncertainties about how well cruise, scale or billed volumes reflect the full volume from a site bring into question the validity of

comparing scale volumes to analysis results. However, the magnitude of the difference for coniferous stands is sufficiently large to suggest that actual volumes were likely overestimated in the base case.

In my determination, as noted in "Reasons for decision", I have accounted for an overestimation of coniferous stand volumes of up to 30 percent. I recognize that this percentage is not based on a thorough statistically-based study, however, the size of the difference found by Slocan is notable, and provides a general sense of the potential magnitudes involved. I expect that inaccuracies in volume estimates will be reduced when new inventory information becomes available for the Fort Nelson TSA, as is planned for the near future. Clearly, given the importance of existing stand volumes in defining timber supply, better estimates should be available for the next AAC determination for this TSA.

2) Deciduous-leading stands

For deciduous stands, the average harvested volume in the base case is 300 m^3/ha, while according to Slocan, the average harvest is 325 m^3/hectare. Slocan suggests that the deciduous harvest flow could be increased by about 10 percent.

As for coniferous-leading stands, no complete inventory audit information is available for the Fort Nelson TSA to provide a statistical evaluation of alleged differences for deciduous stands.

As indicated in sensitivity analysis included in the analysis report, the even-flow harvest forecast for deciduous stands is not affected by uncertainty in existing stand yields. The large deciduous inventory has the capability to absorb substantial decreases in estimates of existing yields, and in the case of increases, the even-flow forecast is defined by long-term yields of managed stands not by yields of existing stands.

Nevertheless, the size of difference noted for deciduous stands could be due to the shortcomings associated with comparisons of cruise, scale or billed volumes to analysis projections. Due to this uncertainty, I cannot reasonably make any adjustments to deciduous timber supply in this rationale on account of this factor.

Expected rate of growth

- estimates for site productivity and regenerated stand volumes

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced in regenerated stands, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In recent years, substantial effort has been expended on developing better estimates of site productivity for stands over 140 years old. In several areas of the province old-growth

site index (OGSI) studies have suggested consistently that actual site indices may be higher than those indicated by existing data from mature forests.

However, no site index adjustments were applied in either the base case or in sensitivity analyses for the Fort Nelson. I believe this was appropriate for three reasons. First, the OGSI adjustments apply only to stands that are currently older than 140 years. Such stands comprise a relatively small portion of the Fort Nelson timber harvesting land base (20% of the coniferous and 3% of the deciduous timber harvesting land bases). Second, almost no OGSI plots were located in biogeoclimatic zones that occur in the Fort Nelson TSA. Finally, given the uncertainties in the inventory, I believe application of adjustments, which rely on accurate description of existing stand heights and ages, would be inappropriate in the Fort Nelson. When more information becomes available regarding site productivity, it can be reviewed in future determinations.

For this analysis, regenerated stand volumes for all pure spruce, spruce/pine, and pine stands were projected according to managed stand yield tables generated using the TIPSY (Table Interpolation Program for Stand Yields) model, and based upon meeting free-growing standards (stand density and brush control).

TIPSY (Table Interpolation Program for Stand Yields) projections for regenerated stands are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand.

However, in the past, areas harvested in the Fort Nelson TSA have been regenerated with lower than optimum stocking densities. Therefore, for the analysis, volume projections for all young stands and NSR areas were based on unmanaged VDYP yield tables as these stands are not expected to produce the same volumes associated with managed stands as estimated by TIPSY.

For the analysis, it was also assumed that regenerated deciduous and both deciduous- and coniferous-leading mixedwood stands will have yields similar to existing stands. Due to limited management, no significant volume productivity gains are expected in these stands upon regeneration, and therefore VDYP was used.

Projected average harvested volume for regenerated stands is 285 m^3/hectare for deciduous and 348 m^3/hectare for coniferous. The projected average volume harvested from regenerated stands is not significantly different from the volume projected from existing stands. However, the age at which these stands are projected for harvest does decrease. I use this comparison only as a general indication that the volume projections for regenerated stands appear to be reasonable. If the projected volumes had been much lower or much higher than current volumes, it would have highlighted a potential area of concern. I am satisfied that estimates for site productivity and regenerated stand volumes on which the timber supply analysis was based represent the best available information and are adequate for this determination.

A final issue with implications for timber yields from regenerated stands is an increase in the amount of budworm infestation in spruce plantations in recent years. In 1998, four plantations were exhibiting signs of severe infestations, and by 1999, infestations were noted in 24 plantations. Indications are that this rate of budworm infestation of plantations will continue in at least the short term.

These plantations are usually associated with river bottom sites (high productivity) that are also adjacent to mature spruce stands. No formal studies have been completed to date to quantify the implications of budworm infestation in plantations and associated volumes.

Mortality associated with infestations of plantations will likely have an unquantified negative effect on regenerated coniferous volumes in the long term. In general, if regenerated volumes are 10 percent lower than assumed for the base case, the long term harvest levels would be about 10 percent lower, but the base case timber supply could still be maintained for over one hundred years. In recognition of the low short-term sensitivity, I am not placing any further weight in this factor at this time. I request that District staff continue to monitor plantation performance and document the productivity impacts of budworm infestations so that the best possible information is available at the time of the next timber supply review.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown or will grow to a harvestable condition. The minimum harvestable age assumption mainly affects when existing younger stands will be available for harvest. This in turn affects how quickly existing mature stands may be harvested such that a stable flow of harvestable timber may be maintained.

Minimum harvestable ages for the Fort Nelson TSA were based upon achieving a stand volume of 140 m^3/hectare.

For the initial 100 years of the harvest forecast, the harvest is projected to come from older unmanaged stands with an average harvested age of 168 years for coniferous stands and 156 years for deciduous stands. Between 100 and 200 years from now, the harvest is projected to come from a mixture of older unmanaged stands and younger regenerated stands. After 200 years all projected harvests are from regenerated stands and the average harvested age declines to just under 120 years for both coniferous and deciduous stands.

For the entire harvest forecast, few stands are harvested at the minimum harvestable age due to the high proportion of older stands available for harvest, the higher priority given to older stands, other resource objectives, and the objective of maintaining an even harvest forecast over time.

Slocan Forest Products feels that setting a minimum harvestable age at 81 years for aspen is not consistent with the genetic nature of the species. They believe that a more appropriate age would be 61 years as many aspen stands reach mean annual increment

(MAI) culmination by that age or earlier. I acknowledge Slocan's assertion, and also note that growth and yield of managed aspen stands is subject to uncertainty given the lack of long-term experience in the area.

Further, I note that timber supply projections are not sensitive to 20-year increases or decreases in minimum harvestable ages, so Slocan's suggestion would have no effect on timber supply at this time. I am satisfied that the criteria for minimum harvestable ages and the projected harvested ages used in the analysis are reasonable for this determination and have made no adjustment on account of this factor. However, I request that the matter of minimum harvestable age estimation for aspen be reviewed prior to the next determination to ensure that the analysis reflects the best available information.

(ii) the expected time that it will take the forest to become re-established on the area following denudation:

- regeneration delay

Regeneration delay is the elapsed time between the harvesting of an area and when it becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the timber supply analysis, prompt reforestation was assumed with regeneration delays of 2 years on aspen- and cottonwood-leading analysis units; and 4 years on conifer-leading, and birch-leading, analysis units.

District staff inform me that a fair number of sites are "hot-planted," that is, reforested within six months of harvest. Given the age of the seedlings themselves, actual delays on these sites would in fact be negative. In addition, comparison of records on the amount of not satisfactorily restocked area to the area harvested annually support that regeneration delays are shorter than used in the base case.

I believe that the actual regeneration delay is probably less than was modelled in the base case. In my determination, therefore, as noted in "Reasons for decision", I have accounted for an unquantified underestimation of the timber supply forecast as a result of shorter regeneration delays.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Areas where the standard regeneration delay has not yet elapsed since harvesting are considered "current" NSR. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is "backlog" NSR.

In the TSA file, 142 238 hectares of land are classified as backlog NSR. Only 25 521 hectares have a history of activity associated with timber production (site preparation, stand tending, logging, or planting) and therefore contribute to the timber harvesting land base. District staff inform me that the backlog area included in the timber harvesting land base includes some areas that have been subject to fire. The areas

included in the timber harvesting land base are mostly on higher productivity sites where salvage harvesting and silviculture have been practiced. Of the timber harvesting land base area classified as NSR, District staff estimate that approximately half is actually restocked, but detailed surveys have not been done.

All other NSR does not contribute to the timber harvesting land base as it is assumed to be non-productive area misclassified as NSR, or a portion of wildfire or range burning.

In addition to the 25 521 hectares of backlog NSR, there are approximately 3 years (2000 hectares) of current NSR in the Fort Nelson TSA.

In the base case, the backlog NSR is projected to be regenerated evenly over the next 9 years. This backlog reforestation program is, however, subject to funding availability. At this time, expectations of district staff are that areas included within existing legal obligations will receive appropriate treatments to reach freegrowing. No specific new investments have been planned, however, when available funding levels are known, plans for expanded programs may be developed. Offsetting this downward pressure on the base case with respect to backlog NSR is the overestimation of the NSR area referenced above. Assuming that funding can be procured to rehabilitate the backlog NSR — and doing so is a priority for the Ministry of Forests — the upward and downward influences on the base case offset one another.

Therefore, on balance I am prepared to accept the base case information on NSR for the purposes of this determination, although activities will have to be monitored to ensure the areas are restocked over the next decade as assumed in the analysis.

(iii) silvicultural treatments to be applied to the area:

Species conversions

Forests in the Fort Nelson TSA cover a wide range of species composition, from relatively pure coniferous stands, through conifer-dominated coniferous-deciduous mixes, to deciduous-dominated mixes, and finally pure deciduous stands. The potential for changes to this mix of species composition has a number of implications for the characteristics of timber supply and for environmental values. The issue of species conversion can be divided into two sub-issues, the first related to unintended changes in composition due to competition, and the second related to intended changes in composition of existing mixedwood stands after harvest.

- species change due to competition

Conifers in regenerated pure coniferous and conifer-leading mixedwood stands are subject to severe competition from deciduous tree species, various shrub species and grass. In initial discussions with district staff, I was informed that difficulties in procurring approval for use of herbicides might result in conversion of young coniferous-leading stands to deciduous-leading mixedwoods. However, district staff inform me that recent approvals for herbicide use have enabled brush control objectives to be met.

In the base case it was assumed that harvested stands will be regenerated with, and retain the same species composition as was originally harvested. Given the information available to me at this time suggesting that competition control measures have been implemented, I believe that the approach used in the analysis is satisfactory with respect to this factor. Consequently, I have made no adjustments on this account in my determination.

Slocan Forest Products has expressed concerns regarding the potential conversion of deciduous stands to deciduous-coniferous mixedwoods. I acknowledge that stand succession may occur in aspen-spruce mixes and is an important issue in managing these stands. However, while trends and general dynamics may be known, rates and magnitudes are highly uncertain. I believe it would be highly speculative and hence unreasonable for me to make any adjustments on this account. Furthermore, my understanding is that these concerns were expressed early on in the TSR process, and discussions on mixedwood management have progressed significantly since that time. I will rely on discussions between government and industry staff related to development of a mixedwood management strategy to refine information for future determinations.

- species conversion upon regeneration in mixedwoods

Discussion has taken place recently in the Fort Nelson TSA regarding the appropriate post-harvest management regime for existing mixedwood stands. In brief, the debate has been whether to attempt to maintain mixedwood stands according to their existing species composition, or to maintain the mix of deciduous and coniferous trees on average over the landscape, but in pure species stands. The latter approach, which is current management, involves establishing pure coniferous or pure deciduous stands in an overall balance based on the pre-existing volume composition. For example, when a 100-hectare stand of mixedwood with a species composition by volume of 60 percent deciduous / 40 percent coniferous is harvested, current management would be to regenerate 60 hectares to pure deciduous, and 40 hectares to pure coniferous. This practice has been termed "area trade" or "unmixing the mixedwoods."

MELP staff have expressed concerns about the habitat implications of removing mixedwood stands from the land base. I acknowledge that the implications to other forest values of unmixing mixedwoods remain uncertain and warrant further study.

I am aware that an independent study commissioned by the Prince George Regional Manager to assist in development of guidelines is now complete, and that strategies for mixedwood management are currently being developed. I trust that a strategy will be completed soon and better information will be available for future determinations.

The base case did not involve explicit modelling of unmixing the mixedwoods. In the analysis, timber yields of pure coniferous stands are projected using managed stand yield tables (TIPSY). However, mixedwood stand volumes are estimated using unmanaged stand yield tables (VDYP). Since managed stand yields are higher than those from unmanaged stands, establishing pure coniferous stands after mixedwood harvests may increase timber supply relative to assumptions made for the base case. However, given the

short time over which the current management approach of unmixing has been practiced, the yield impact relative to the base case is uncertain at this time. Actual species composition and yields need to be monitored to establish whether or not an increase in coniferous yields actually occurs.

No similar issues were raised with respect to timber yields in the post-harvest deciduous-leading portions of existing mixedwoods. Given the lack of experience in mixedwood management, the yield implications are uncertain, and require monitoring to ensure that information improves over time.

Given these uncertainties and the ongoing development of a mixed management strategy, I have not made any adjustments to either coniferous or deciduous yields after mixedwood harvest on account of the post-harvest regeneration of mixedwood stands to pure conifer or deciduous stands. Implementation and monitoring of outcomes of the strategy should provide improved information for the next AAC determination for the Fort Nelson TSA.

Silvicultural systems

The predominant current harvesting method within the TSA is clearcut with reserves. Some alternate harvesting treatments are presently taking place within the TSA, but on a limited experimental basis only.

In general, carefully implemented clearcut systems are appropriate in fire-dominated ecosystems, which comprise much of the Fort Nelson TSA. Alternative systems may have potential for addressing some management concerns, such as retention of understorey vegetation. However research related to the application of alternative systems in the area is just beginning.

I am satisfied that the regeneration assumptions that have been modelled in the analysis represent the best available information and are adequate for use in this determination. New information on silviculture systems can be incorporated into future determinations.

Non-Commercial Brush (NCBr) conversions

Non Commercial Brush (NCBr) types cover 511 797 hectares of the TSA. These areas are considered unlikely sites for timber production without rehabilitation efforts.

Areas where rehabilitation activities have occurred are included in the timber harvesting land base.

For the base case, it was also assumed that an additional 2500 hectares of future rehabilitation will take place in the first 10 years of the analysis horizon (250 ha/yr).

Slocan Forest Products supports an analysis and rehabilitation program to target NCBr to be reforested to commercially viable crops. The company believes that reforesting a

portion of these areas at the current average MAI of 2.52 m^3/yr would show a significant increase in AAC for the TSA.

Fort Nelson District staff consider the base case assumptions to reasonably reflect current plans, provided program funding for NCBr rehabilitation continues. Should any shortfall occur in NCBr conversion relative to the 2500-hectare target over the next 10 years there would be a corresponding overestimation of the timber harvesting land base. However, even if none of the rehabilitation occurred, there would be a very small effect on the long-term harvest forecast (maximum 0.3 percent reduction).

Accordingly, given the existing rehabilitation plans, the likelihood that at least some rehabilitation will occur, and the small impact of falling short of the modelled assumptions, I am satisfied that the assumption of 250 hectares/year NCBr conversion is appropriate for use in this determination.

(iv) the standard of timber utilization and allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:

Utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the following standards were applied:

- 17.5-centimetre diameter at breast height (dbh) for spruce- and balsam-leading stands, and a 12.5-centimetre dbh for pine- or deciduous-leading stands;
- 30-centimetre maximum stump height; and
- 10-centimetre minimum top diameter inside bark.

Within the analysis, secondary species were assigned the same utilization levels as the leading species. For aspen and cottonwood, the 10-centimetre top diameter inside bark reflects the average diameter at which the first major branching occurs.

The modelling approach reflects current management, and I consider the utilization assumptions used in the timber supply analysis to be reasonable for use in this determination.

Within the current analysis, when birch is a minor component of a harvested stand, the birch volume contributes to the overall volume of that stand and subsequently towards the long term harvest level.

In TSR I, minor components of birch (about 23 000 m^3/yr) were considered in the deciduous partition of the harvest profile, but not in the coniferous timber supply.

On September 18, 1996 the Forest Appeals Commission determined that when birch above the current utilization levels is left on the block, this volume does not need to be charged toward the AAC. (This ruling seemed to have occurred because it was not evident that any birch contributed to the AAC).

I am clarifying that secondary volumes of birch do contribute to the timber supply assumed in this determination for both coniferous- and deciduous-leading stands.

Decay, waste and breakage

The VDYP model projects natural stand volumes that reflect estimates of losses to decay, waste and breakage. Decay, waste and breakage factors are applied during development of yield curves using VDYP. These estimates of losses have been developed for different areas of the province based on field samples. For regenerated stands, as previously discussed (see *estimates for site productivity and regenerated stand volumes*), OAFs were used in the TIPSY model to account for anticipated decay, waste and breakage.

The decay, waste and breakage factors used for the Fort Nelson TSA are based upon on the Forest Inventory Zone (FIZ) and Public Sustained Yield Unit (PSYU) survey information from 1976. The sample size used for these factors was small, particularly for aspen, birch, and pine. The local applicability of factors based on samples and data from throughout an inventory zone is questionable. However, at this time the existing factors represent the best available information.

The Ministry of Forests is developing new loss factors based on the biogeoclimatic ecosystem classification (BEC). The development of the new BEC-based loss factors will incorporate numerous new sample trees and statistical methods.

Additional refinement of decay, waste and breakage factors will be made as the VRI is completed for the Fort Nelson TSA. I expect that these improvements and refinements will be incorporated into the next timber supply analysis and AAC determination for the Fort Nelson TSA.

Notwithstanding the uncertainties, the FIZ-based decay, waste, and breakage factors used in the analysis represent the best information at this time. I am not aware of any information to suggest that the factors used in the analysis either over- or underestimate actual decay, waste and breakage, and therefore I consider them to be suitable for use in this determination. Updated information can be used in future determinations.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these

resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

- cutblock adjacency, forest cover and green-up

To manage for resources such as water quality, wildlife and aesthetics, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. The objective of green-up requirements is to maintain water quality, wildlife habitat, soil stability and aesthetics. Adjacency, green-up and forest cover objectives guide harvesting practices to provide for a distribution of harvested areas and retained forest cover in a variety of age classes across the landscape.

To reflect these objectives in the timber supply analysis, it was assumed that, at any time, a maximum of 39 percent of the timber harvesting land base in each of the 72 landscape units could be covered by stands that have not met the 3-metre green-up height requirement.

In the base case, the forest cover requirements used to approximate adjacency requirements constrain timber supply in individual landscape units for short periods during the 250-year horizon. For the entire TSA, the timber supply is not affected however, since harvesting is able to shift among landscape units to maintain the overall harvest flow while still meeting the green-up requirements.

Analysis indicates that if the adjacency requirements were not applied, neither the coniferous nor the deciduous base case harvest forecast would be affected.

Likewise, the base case harvest forecast is not affected if green-up height is increased to 8 metres from the 3-metre height assumed in the base case. This change corresponds to an increase in the average green-up age to 30 years from the base case average of 15 years. In fact, green-up ages could be extended beyond the time required to achieve 8 metres by another 6 years for coniferous stands, and 15 years for deciduous stands before significant deviations in timber supply would occur relative to the base case forecasts. Therefore, the analysis indicates a great deal of flexibility to absorb any timber supply impacts related to uncertainty in green-up requirements.

In its submission, MELP expressed the belief that in landscape units with higher than average proportions of timber harvesting land base the 39 percent green-up requirement could result in hydrological problems. Assuming an average natural disturbance interval of 112 years, if the non-contributing forest covers 43 percent or less in a landscape unit there is some potential that the forested area not meeting hydrological green-up could exceed 30 percent of the landscape unit, or a watershed within the landscape unit. I note the

MELP concern, however analysis reveals that only 4 landscape units have 43 percent or less of their area non contributing, suggesting that this is unlikely to have a major impact on watershed hydrology. Furthermore, watershed assessments are required to determine the appropriate rate of development in watersheds, and the hydrological state of watersheds should be monitored to ensure harvesting is consistent with water quality objectives.

I am satisfied that the adjacency and green-up assumptions on which the timber supply analysis was based represent the best available information and are adequate for use in this determination.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The *Forest Practices Code* requires the establishment of riparian reserve zones that *exclude* timber harvesting, and riparian management zones that *restrict* timber harvesting, in order to protect riparian and aquatic habitats. The *Riparian Management Area Guidebook* describes stream classes and includes estimates of the area needed in riparian reserves and riparian management zones for each class.

A comprehensive stream inventory is not available for the Fort Nelson TSA. In order to approximate the land base reduction needed to account for riparian reserve and management zones within the TSA, a preliminary study was completed prior to the 1994 determination using 7 mapsheets believed by BCFS staff to be representative of the coniferous land base, and 3 mapsheets representative of deciduous stands. Based on the results of this study, 8.1 percent of all coniferous-leading stands (83 880 ha), and 4.1 percent of all deciduous-leading stands (20 061 ha) were excluded from the timber harvesting land base for riparian areas (the areas listed apply to the land exclusion order used for the analysis, the total riparian area is larger). While the study used as the basis for estimating the overall riparian area is the best information available, the representativeness of the mapsheets used, as well as the low experience with Code implementation at the time of the study bring to question the accuracy of the riparian area exclusions. Nevertheless, there is no firm evidence that the exclusions are in fact inaccurate, or even more broadly that they are either under- or overestimated. I note that the 8.1% reduction for coniferous stands appears high relative to some other areas of the province, however I am not aware of evidence that explicitly indicates this reduction is inappropriate for the Fort Nelson TSA.

The Fort Nelson First Nation is concerned that areas along rivers over 100 meters wide, which are important for hunting, trapping, gathering and other traditional use activities, are not required to have reserves. I acknowledge this concern, however, the practices in the district follow *Forest Practices Code* guidelines, and I believe operations can be designed to integrate timber harvesting with these other uses. Therefore, I will not make any adjustments on this account, and trust that the Crown's legal obligations respecting First Nations will be met during operational planning.

MELP comments that, since the early 1970s, licensees have concentrated harvesting in white spruce and spruce/cottonwood types along river corridors and floodplains, to the

detriment of wildlife and biodiversity management. They also assert that river corridors are now Special Management Areas within the LRMP, and hence a different management regime is expected. They state that this type of change may affect timber production. I have been advised however, that not all river corridors are Special Management Areas. In any event, I expect that protection of riparian values will be achieved through adherence to Code guidelines, and through implementation of LRMP strategies and objectives.

MELP further notes that spruce forests often include relatively large wetlands and other non-forested sites that were not recorded in the forest inventory. MELP submits that therefore, riparian exclusions are insufficient to account for in-stand wetlands. Again, I acknowledge these concerns, however, the overlap with non-merchantable land base exclusions, the degree to which existing stand volume estimates implicitly deal with in-stand non-timbered areas, and the magnitude of the possible riparian area underestimation, if in fact there is one, are all uncertain. Hence I cannot verify their conclusion at this time.

I recognize that there is uncertainty in the riparian reduction, but I do not have sufficient evidence to validate whether there is a trend toward over- or underestimation of the area reserved from harvest in riparian buffers. Therefore, given all of the above considerations, I conclude that reductions made for riparian reserve and management zones were based upon the best information available, and I accept them as suitable for use in this determination. I suggest that the stream inventory study be revisited to ensure riparian areas are appropriately represented in the next analysis and determination.

- visually sensitive areas

To achieve visual quality objectives (VQOs) in visually sensitive areas, constraints are placed on timber harvesting, road building and other forest practices. The constraints, which are based on experience, research findings and public preferences, are expressed in terms of forest cover requirements that relate to the maximum percentage of a "viewshed" that may be harvested at any one time, and to 'visually effective green-up' (VEG)—the stage at which a stand of reforested timber is perceived by the public to be satisfactorily "greened-up" from a visual standpoint.

Only 11.8 percent of the coniferous and 13.7 percent of the deciduous timber harvesting land bases in the TSA (12.6 percent of the total timber harvesting land base) are subject to approved or proposed VQOs.

Neither coniferous nor deciduous timber supplies are sensitive to changes in requirements for visual quality within the range tested. This is due to forest outside of the timber harvesting land base playing a large role in achieving visual quality objectives, and because the area subject to VQOs is fairly small

Slocan Forest Products recommended that, as VQOs have not been established in the TSA, that they not form a part of the base case. According to District staff, the licencee is aware of the proposed areas, and is managing to achieve the recommended visual quality classes

(RVQOs) associated with those areas. The visual management areas are noted in silviculture prescriptions. Therefore, I believe that incorporating all visually sensitive areas and RVQOs in the base case is a reasonable approximation of how these areas are likely to be managed, although I acknowledge that further requirements are possible in the future. In the meantime, I consider it reasonable to have reflected the visual sensitivity of part of the landscape in the base case, and am making no further adjustments due this factor.

- cultural heritage resources

As noted above in 'Description of the TSA', Fort Nelson, Dene Tsaa Tse K'Nai, Dena Tha', Fort Liard, and Kaska-Dena, Halfway and Talhtan First Nations have identified traditional territories in the Fort Nelson TSA. Cultural heritage resources are defined in the *Forest Act* and include archaeological sites, traditional use sites and objects such as culturally modified trees (CMTs). Archaeological sites and CMTs that predate 1846 are protected under the *Heritage Conservation Act*. The nature and extent of required protection of archaeological sites are detailed under this legislation.

An archaeological overview assessment and mapping of archaeological potential have been completed for the Fort Nelson TSA. A traditional use study is ongoing. The Ministry of Forests is currently working with First Nations to complete inventories and develop appropriate management strategies for the protection of known sites.

For the analysis no specific reductions for cultural heritage resources were made as it was assumed they could be addressed through other area reductions, including removal of area not administered by the Ministry of Forests, riparian reserves, and within block biodiversity reductions.

The Fort Nelson First Nation suggests that uncertainty with respect to cultural heritage resources is justification not to increase the AAC. While I acknowledge the concerns of First Nations that their rights be protected, there is no evidence that doing so has affected the size of the timber harvesting land base. As noted elsewhere in this document, the Crown has legal obligations regarding First Nations and these should be handled through careful planning and ongoing operational considerations.

Future analyses will consider both cultural heritage resource information, as it becomes available, and/or associated management strategies, as they are developed. I am satisfied that the timber supply analysis has used the most current cultural heritage resource information.

- identified wildlife

Under the *Forest Practices Code of British Columbia Act*, identified wildlife are those wildlife species and plant communities that have been approved by the chief forester and deputy minister of Environment, Lands and Parks or designate as requiring special management. The province's Identified Wildlife Management Strategy (IWMS) for dealing with endangered, threatened, vulnerable, and regionally significant species which

have not been accounted for with existing management strategies, was announced February 19, 1999.

Identified wildlife will be managed through the establishment of Wildlife Habitat Areas (WHAs) and the implementation of general measures for wildlife, or through other management practices specified in higher level plans. There are no established or proposed Wildlife Habitat Areas (WHAs) in the Fort Nelson TSA.

In the Fort Nelson TSA, reserve areas have been identified and mapped around several Northern Goshawk nests. Although habitat areas for some of the other identified wildlife have been noted, harvesting has not generally taken place in close enough proximity to require alterations to practices.

The Fort Nelson First Nation is concerned about implications of a statement in the Fort Nelson TSA analysis report that "...plant and animal species dependent on mature and old-growth forest remain at moderate risk levels due to forest harvesting activities which will convert older forests to young forests." They infer from this statement that their right to trap will also be subject to moderate risk. According to the submission, First Nations trap some species that are at risk due to habitat loss (e.g., fisher). I note that the comment in the timber supply analysis refers indirectly and generally to the balance that the province is attempting to achieve between protection of the environment and allowance for economic activity, which is reflected in Forest Practice Code provisions. Implementation of biodiversity and habitat provisions in the Code and the LRMP should serve to manage the risks to environmental values involved when undertaking forest harvesting. Further, neither the Code nor the LRMP limit First Nations rights. In my judgement, the analysis is consistent with existing law and policy. Also, operational planning must be consistent with the Crown's legal obligations respecting First Nations rights. I will therefore make no adjustments on this account in this determination beyond the one-percent reduction to account for identified wildlife management in general, which I reference below.

The specific impacts of WHA establishment on timber supply in the Fort Nelson TSA are not currently known. However, government has allocated a provincial timber supply impact of one percent to management of identified wildlife species. Since no accounting was made in the analysis for the management of identified wildlife, for this determination I have accounted for a possible one-percent overestimation in the timber harvesting land base used for the base case forecast. I encourage Forest Service and MELP staff to continue to work co-operatively to establish WHAs as soon as possible to clarify management for and ensure protection of identified wildlife.

- stand-level biodiversity

Biological diversity, or biodiversity, is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems, and the evolutionary and functional processes that link them. Under the *Forest Practices Code*, biodiversity in a given management unit is assessed and managed at the stand and landscape levels.

Stand-level biodiversity is managed in part by retaining reserves of mature timber or wildlife tree patches (WTP) within cutblocks and in adjacent inoperable and other retained areas to provide structural diversity and wildlife habitat. Provision is also made through the retention of coarse woody debris.

Staff from the Fort Nelson Forest District and MELP have published stand-level biodiversity guidelines for the Fort Nelson TSA that require a minimum retention of 10 percent of the total area under prescription for wildlife tree patches. This requirement was meant as an interim measure to ensure protection of old seral forests prior to completion of landscape unit planning in the district. For the purposes of timber supply analysis, a 5 percent reduction to the area in all stands within the timber harvesting land base was applied to account for stand-level biodiversity requirements (68 536 ha). This reduction is based on the assumption that only half of the total estimated requirement of 10 percent must be provided by within-block constraints. It is assumed areas that do not contribute to the timber harvesting land base; for example, areas not harvested due to riparian considerations, will provide the remaining 5 percent.

District staff advise me that, although it is somewhat uncertain, these reductions for stand-level biodiversity could be slightly higher than will ultimately occur after full implementation of both landscape- and stand-level biodiversity management under the Code. District staff submit that current practice as demonstrated in silviculture prescriptions approximately reflect the analysis reductions. Therefore, I conclude that reductions for stand level biodiversity used in the base case are appropriate for this AAC determination. Management for stand-level biodiversity should be monitored so that better information will be available for future determinations.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that management for these landscape-level concerns—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives as discussed throughout this document—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

Management for landscape-level biodiversity was modelled through the use of forest cover requirements applied to each combination of natural disturbance type (NDT), biogeoclimatic subzone and variant within each landscape unit. In the base case, requirements for old seral representation were applied in the Spruce-Willow-Birch (SWB) biogeoclimatic zone (NDT 2), while mature-plus-old and old seral requirements were applied in the Boreal White and Black Spruce (BWBS) zone (NDT 3).

The old and mature-plus-old requirements were weighted according to the assumption that lower and intermediate biodiversity emphases will both apply to 45 percent of the land base, while higher biodiversity emphasis will apply to 10 percent. No requirements limiting the area in early seral condition were applied in the base case.

Sensitivity analyses evaluated the following options:

- apply early- and mature-plus-old, as well as old-seral requirements in all NDT and biogeoclimatic variant combinations within each landscape unit, as outlined in Tables 7 and 11 of the *Biodiversity Guidebook*;
- apply mature-plus-old as well as old seral requirements to the same NDTs as in the base case, but use requirements applicable to the biodiversity emphasis options developed for all landscape units as part of the Fort Nelson District landscape planning process (BEO assignments), rather than weighted requirements;
- apply early-, mature-plus-old, and old seral requirements to the same NDTs and biogeoclimatic variant combinations as in the base case, but use requirements applicable to higher biodiversity emphasis in all landscape units, rather than weighted requirements.

In none of these cases is timber supply either increased or decreased. The lack of impact is due primarily to abundant existing mature and older stands in the timber harvesting land base that meet the requirements in the short- and medium-term while stands outside of the timber harvesting land base age enough to meet the requirements over time.

Recent operational planning experience indicates that implementation of biodiversity requirements may be more challenging than suggested by the analysis results. The analysis methods do not account fully for factors such as spatial distribution, size, species composition of forest patches, and the pattern of existing disturbance that influence the ability to achieve seral-stage representation objectives.

Slocan Forest Products notes that spatial identification of Old Growth Management Areas (OGMAs) and other such features is difficult in certain landscape units. The company believes that management for these features will likely have an impact on the land base, unquantifiable at this time, but estimated to be in the range of 3-5 percent, or about 40 000 m^3 per year. Future development of spatial analysis techniques and supporting data can be expected to improve the capability to examine spatial issues such as those mentioned, and define the level of any impacts on timber availability, but at this time I view the information used in the analysis is the best available.

In the base case, forested areas excluded from the timber harvesting land base are forecast to meet almost all landscape level biodiversity requirements for old-age forests, particularly over the long term. However, there is some uncertainty that forests outside the timber harvesting land base will achieve all requirements; for example, achieving appropriate spatial distribution of old-seral forests to meet biodiversity objectives described in the

Landscape Unit Planning Guide may require retention of some old-age forests within the timber harvesting land base.

To assess the importance of forest outside the timber harvesting land base in maintaining the base case timber supply projection through its provision of old-seral forest, a sensitivity analysis assessed timber supply if seral requirements were applied to the timber harvesting land base separately. Applying forest cover requirements for old forest to the timber harvesting land base reduces the base case coniferous harvest forecast by 110 000 cubic metres (8 percent). On the deciduous land base, short and medium term timber supply is not affected, but the deciduous long term harvest level is 100 000 cubic metres per year (11 percent) lower than the base case.

District staff anticipate that the spatial application of landscape-level biodiversity requirements will not be difficult to achieve. While it has been implied that achieving these requirements only from areas outside of the timber harvesting land base may be difficult, I will await the results of landscape unit planning and take any specific findings into account in future determinations. This may result in a downward pressure on timber supply, but information is insufficient to allow me to assess the likelihood or magnitude.

MELP staff are concerned that future road reductions estimate that 5 percent of the timber harvesting land base will be harvested and then kept permanently in an early seral stage (bare ground). When this is removed from the forested land base, it no longer forms part of calculations for biodiversity constraints even though that area has been permanently removed as habitat.

MELP recommends modelling actual BEOs (and removal of OGMAs from timber harvesting land base where necessary) rather than standard 45/45/10, which was done in a sensitivity analysis described above.

MELP further notes that the model grows the timber in the non-contributing land base without any consideration of natural disturbance. They assert this to be an incorrect assumption given the fire return interval is about 125 years for conifer-leading and 100 years for deciduous-leading stands. They offer two analytical solutions:

- hold the age distribution of forest outside the timber harvesting land base constant, which would reflect that forest ages are a result of a natural disturbance regime that will likely continue
- model a natural disturbance rate of 0.9 percent/year, based on mean fire return interval described in the Biodiversity Guidebook. If model cannot handle natural disturbances, then pretend this amount is harvested annually and re-grow using growth tables for naturally established stands.

Sensitivity analysis discussed above illustrated the importance of forest outside the timber harvesting land base in achieving biodiversity objectives. The available analyses therefore provide information showing the impact of both optimistic and pessimistic views of role of forest outside the timber harvesting land base.

MELP also comments that "trends in global warming indicate northern interior is warming at a rate of 3 times the global average. This is likely to increase the risk of stochastic natural fire events, and indicates need to be more cautious about the status of non-contributing stands". Given the substantial uncertainties around the ecological effects of climate change, it would be highly speculative for me to make any adjustments on this account at this time. Future determinations can incorporate updates in information.

In conclusion, I am aware of the complexity of, and many questions raised about management for, landscape-level biodiversity. However, there is no more certainty surrounding the expressed concerns than there is in the information used in the base case. The analysis approach followed provincial standards and policies regarding landscape-level biodiversity. Sensitivity analysis showed timber supply to be insensitive to most uncertainties about landscape-level biodiversity, given the large amount of forest outside the timber harvesting land base. I believe it is reasonable to expect that the substantial forest area unavailable for harvest can be expected to meet landscape-level biodiversity objectives over much of the land base, recognizing that the assumption that non-harvested forest will continue to age indefinitely is not entirely accurate. It will be important to complete landscape unit planning to improve certainty about biodiversity management and timber supply impacts, and to develop new modelling methods to address forest and disturbance dynamics both outside and inside the timber harvesting land base. Such improved information can, when it becomes available, be used in future determinations. Keeping in mind the above comments, I am satisfied that for this determination the assumptions applied in the analysis are based on a reasonable methodology and represent the best available information.

- Land and Resource Management Plan

In October 1997 the government of British Columbia approved the Fort Nelson Land and Resource Management Plan (LRMP).

The base case incorporates provisions of the LRMP. At the time of its approval, the LRMP was believed to have an impact on the timber harvesting land base of less than 4 percent.

District staff assure me that the modelling assumptions appropriately reflect land use and management direction in the LRMP. Based on my review of the analysis assumptions and the LRMP I accept this to be a reasonable conclusion.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;

Other First-Nations Issues

In addition to the information considered above in *cultural heritage resources*, I have also considered the following input to my determination.

Four First Nations — Fort Nelson First Nation, Dene Tsaa Tse K'Nai First Nation and the Dena Tha' First Nation and Halfway First Nation — are signatories to Treaty 8, which covers the Fort Nelson TSA. The Fort Liard First Nation, the Dene Tha' of Assumption, Alberta, the Kaska-Dena First Nation and Tahltan First Nation all have traditional territory in the timber supply area.

Recently the First Nations of the area have expressed increasing concerns regarding forest management in the TSA and its potential infringement on their Treaty and Aboriginal Rights.

These concerns have often been accompanied by requests for funding for the purposes of consultation and capacity building. The Ministry of Forests has not had the resources to fund such requests.

The Kaska Dena First Nations (Lower Post) are in the process of entering into Treaty Negotiations. Much of the area identified in this process is within the Fort Nelson TSA.

The Fort Nelson First Nation has commented that they are concerned that an increase in AAC will negatively impact their traditional and treaty rights.

The legal and policy environment respecting First Nations is evolving rapidly. As noted elsewhere in this document, the Crown has legal obligations with respect to First Nations related to recent Supreme Court of Canada decisions. These requirements must be respected during planning and operations. I have considered specific First Nations concerns at various points in this rationale, and will make no specific adjustments with respect to the information presented here.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area;

Alternative rates of harvest

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber

supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The base case harvest forecast shown in the March 2000 *Fort Nelson Timber Supply Area Analysis Report* was defined mostly by the long-term productivity of the timber harvesting land base. Short- and medium-term timber supplies in the base case forecasts were not at the maximum possible levels. Given the accumulation of growth over many years, alternative harvest forecasts with higher initial levels are possible. This is particularly the case on the deciduous land base. One coniferous alternative flow, and two deciduous alternative flows, were shown.

Criteria used when generating alternative harvest flows include maintaining a fairly constant growing stock level over the long term, and avoiding any large and abrupt timber supply shortfalls. The first criterion is an indicator of long-term sustainability, while avoiding excessive timber supply fluctuations provides for socio-economic stability and helps to maintain future options. In the three alternative harvest flows considered, timber supply never declined below base case levels for either the coniferous or deciduous land bases.

An alternative harvest flow for coniferous shows that a level 6.25 percent higher than the base case can be maintained for 5 decades, if the harvest then declines to the base case level for the long term.

For the deciduous land base, one alternative harvest forecast showed an initial harvest level 66 percent greater than the base case. This harvest flow could be maintained for 5 decades if followed by a 10 percent rate of decline to the long term harvest level. The deciduous growing stock associated with this forecast declines more quickly relative to the base case which may limit flexibility to respond to future changes in management practices, objectives, or new information.

The B.C. Ministry of Environment, Lands and Parks believes that, without a thorough environmental analysis, it is difficult to evaluate the short- and long-term implications of a dramatic increase in timber supply and a subsequent decrease in average age proposed in the analysis report. I acknowledge this concern, and note that all land base exclusions and forest cover requirements for biodiversity and visual quality that were included in the base case were also included in these alternative flows. This is not to say the environmental implications of the alternative flows would not be different, but simply to highlight that environmental considerations were not abandoned when generating the alternatives.

In making my determination, I have taken into account the alternate harvest flow implications described above.

Socio-economic analysis implications

The socio-economic analysis (SEA) indicated that the base case forecast could potentially support an increase of 620 person years of employment across the Province, and indirect and induced employment could increase by approximately 730 person years relative to the current AAC.

Increasing the harvest level to that indicated in the base case harvest forecast could lead to the construction of new milling capacity. Where the extra timber would be milled, and by whom, is uncertain.

The Northern Rockies Regional District and Town of Fort Nelson support attraction of a second company to the region. They are concerned that currently the health of the community depends on only one company, which holds a lot of power as a key purchaser of goods and services.

The Fort Nelson Regional Economic Task Force noted that some residents and industries think one licensee is an advantage, while others think this may be risky given the volatile nature of the industry and that diversification would moderate risk.

IWA Canada supports the construction of another timber manufacturing facility in Fort Nelson. IWA might support Slocan Forest Products getting more fibre if they have a plan to create new jobs in Fort Nelson. They would be more supportive of another company locating a manufacturing facility in Fort Nelson, to break the one-company monopoly, adding diversity and healthy competition, and creating new jobs.

The Northern Rockies Regional District and Town of Fort Nelson encourage the pursuit of value added industry (e.g., CCMC demonstrated higher jobs/hectare harvested than primary manufacturing).

The Fort Nelson Regional Economic Task Force feels that value-added manufacturing would help offset high transportation costs associated with the TSA, and that a study to research innovative transportation partnerships would be valuable.

The Northern Rockies Regional District and Town of Fort Nelson, and Fort Nelson Regional Economic Task Force, are opposed to any movement of unprocessed logs outside of the Region. They feel that wood harvested in the TSA must be processed in the TSA and all direct jobs and related economic benefits must remain in the region. This applies to the SBFEP as well as other licencees. Concern was noted that SEA frequently referred to movement of timber outside the region for processing and the tone appeared to be presenting a preconceived conclusion.

The Northern Rockies Regional District and Town of Fort Nelson feel that the AAC process must ensure the ongoing strength of existing operations and provide a strong base from which to launch any new initiatives. The new AAC must also protect the range of other forest values.

The Northern Rockies Regional District and Town of Fort Nelson is in support of an increased AAC provided it is based upon good science and if the level of confidence is high. At the same time, the Fort Nelson First Nation does not feel that the AAC should be increased.

I am aware of the importance of the forest industry in this TSA, and I have considered this in my determination, along with the social and economic objectives of the Crown. Notwithstanding the biophysical and economic uncertainties and associated risks discussed elsewhere in this rationale, I note that there is currently no infrastructure in the Fort Nelson area that could utilize the extra timber supply indicated in the base case. Hence, if harvest levels were to be increased, new infrastructure would have to be constructed. To justify such an endeavour from both social and economic perspectives, the extra timber supply would have to be stable and as certain as practicable. I believe that any increase in timber supply as part of this determination would send a signal to the community and local or prospective industries that the increase is stable and certain. This issue is a factor in my determination, as will be discussed in "Reasons for decision."

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;

Timber processing facilities

Approximately 85 percent of the timber processed at Fort Nelson mills is harvested from the Fort Nelson TSA. The remainder comes from private and out-of-province sources. The base case forecast indicates that the supply of timber from the Fort Nelson TSA is very secure. Both the deciduous and the coniferous timber supplies are sufficient, at least in volume, to supply the current needs of local processing facilities.

Canadian Chopstick Manufacturing Company (CCMC) suspended operations in Fort Nelson as of April 1997. As of May 15, 2000 CCMC's Forest License (A32900), which is apportioned 69 384 m^3/year, was suspended by the Ministry of Forests.

Slocan, and its subsidiary Tackama Forest Products, are the only major wood product processors currently operating in the Fort Nelson TSA.

In 1998, the Tackama lumber mill processed almost 339 000 cubic metres of timber; the veneer/plywood mill processed approximately 335 000 cubic metres, and the oriented strand board mill, which began operations in 1996, processed approximately 610 000 cubic metres of timber.

Within Slocan's Tackama Division, $15 million was spent installing a single state of the art lathe line replacing the two existing lathes and a fourth veneer dryer. This will increase the veneer recovery, and increase plywood production by 43 percent to 300 million square feet (3/8" basis). This investment will also allow for the expansion of the range of plywood products produced.

Within Slocan's PolarBoard divisions (OSB) approximately $10 million was spent to increase the total OSB production by 20 percent to 510 million square feet (3/8" basis).

In addition to the major licensees there are 4 small sawmill operators within the TSA. One of these is registered with the Small Business Forest Enterprise Program (SBFEP). The remainder rely on wood supplied from the oil and gas industry (volumes from small areas of land cleared for associated development) and/or wood removed from personal agriculture leases. None of these operators have the capacity to mill more than 10 000 m^3/yr.

Omineca Enterprises suggests that a fair settlement is required after a long dispute with the Provincial government regarding a forest license. The company feels that cutting rights that will infringe on Omineca Enterprises' past, present, and future timber rights should not be issued.

Omineca Enterprises has also submitted 2 binders of historic information and correspondence to the Premier, Minister, Deputy Minister, Timber Supply Branch, Region and District Managers and the Job Protection Commissioner. What I determine for an AAC has no bearing on the allocation of, or entitlement to, any individual or licensee, except under specific circumstances referenced in legislation (e.g., where an AAC reduction for a TSA could lead to proportionate reductions for licence AACs). In the case of this determination, such a circumstance does not arise. The *Forest Act* outlines my responsibilities for determining an AAC for the TSA, not for specific licenses. I am not aware of any information to suggest that the issues regarding Omineca's assertion of rights affect the capability of the TSA to produce timber. If there are administrative or legal changes in the future relevant to AAC determination for the TSA, they can be incorporated into future AAC decisions. I will make no related adjustments in this determination on this account.

Pulpwood Agreement 14

Pulpwood Agreement (PA) 14 provides Slocan Forest Products the right to harvest not more than 610 000 m^3/yr from deciduous-leading stands in the pulpwood area, subject to the terms and conditions of the PA. The volume allocated to PA 14 is included in the 900 000 m^3/yr AAC partitioned to deciduous stands.

I have considered the 610,000 m^3/year allocated to Pulpwood Agreement 14 as contributing to the AAC as discussed, above, and no adjustments are required with respect to the agreement in my determination.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). This letter and memorandum together include references to forest investments, forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have reviewed the opportunities for commercial thinning, and am convinced that forest conditions are not appropriate for this form of harvesting in this TSA at this time. Furthermore, there has been no notable commercial thinning in the TSA to date, and no expressed interest in either undertaking thinning or in using commercial thinning products. With respect to harvesting in previously uneconomic areas, without comprehensive operability mapping for the TSA, I must rely on the delivered wood cost exercise used to approximate the operable land base. Better inventory information may allow better evaluation of opportunities for the next determination.

The Minister's memorandum addressed the effects of visual resource management on timber supply. In it, the Minister asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unreasonably restrict timber supply. As discussed under *visually sensitive areas*, neither coniferous nor deciduous timber supplies are sensitive to changes in requirements for visual quality within the range tested. This is due to forest outside of the timber harvesting land base playing a large role in achieving visual quality objectives, and because the area subject to VQOs is fairly small. Hence, no adjustments to the base case forecast would be justified with respect to visual management.

Local objectives

The Minister's letter of July 28 1994 (Appendix 3) suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

Fort Nelson District staff actively solicited public input on the Timber Supply Review in the Fort Nelson TSA through the following actions:

- copies of the *Information Report* were mailed to 32 stakeholders, interest groups and individuals in the Fort Nelson TSA or adjacent timber supply areas. Copies were also mailed to the Kaska Dene Council, Dene Keepers of the Earth, Treaty 8 Tribal Association, and Fort Nelson, Dene Tha, Fort Liard, Kaska Dene and Prophet River First Nations.
- copies of the *Data Package* were mailed to the forest licensee (Slocan Forest Products) and to the Fort Nelson, Dene Tha, Fort Liard, Kaska Dene and Prophet River First Nations.
- copies of the *Fort Nelson TSA Analysis Report* and *Public Discussion Paper* were mailed or provided to Slocan Forest Products, Fort Nelson Town Council, the Northern Rockies Regional District, and the Fort Nelson, Dene Tha, Fort Liard, Kaska Dene and Prophet River First Nations
- the *Data Package* and the *Fort Nelson TSA Analysis Report* were also available at the forest district office in Fort Nelson and about six of each were picked up.
- meetings regarding both the *Data Package* and *Analysis Report* were held with representatives from local government and the Land and Resource Management Plan (LRMP) Working Group.
- district staff responded to a number of phone calls and held informal meetings with interested individuals and the forest industry to explain the information in the reports and to answer specific questions.
- an offer to present or discuss the *Data Package* and the *Analysis Report* was made to all First Nations with interests in the Fort Nelson TSA.
- the local newspaper was provided with news releases and published stories on the Timber Supply Review in the Fort Nelson TSA.

The Fort Nelson Forest District received nine written submissions on the *Data Package* and seven submissions on the *Analysis Report.*

Wherever possible, I have attempted in the appropriate sections of this rationale to respond to the views expressed, and consideration of this input has been an important component of this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area

Unsalvaged losses

For the base case, the average annual volume of timber damaged by spruce beetle, budworm attack and wildfires that remains unsalvaged was estimated as approximately 64 000 m^3 of timber.

Recently, spruce budworm overview mapping has indicated a significant increase in the amount of spruce budworm defoliation. Overview assessment mapping indicates that a total of approximately 1 170 402 hectares of forest were subject to severe budworm defoliation in 1999.

Salvage operations have not previously targeted stands attacked by budworm. This is likely a result of the small amount of volume previously attributable to these losses, and the distant or otherwise inaccessible location of these areas. If such severe defoliation continues it is likely that salvage operations may be directed towards stands with the highest degree of mortality.

With the increase of the spruce budworm infestation in the TSA, understory spruce stands have been affected often to a greater extent than older conifer-leading stands. Understory spruce is poorly accounted for in the current forest inventory due to the difficulties associated with gathering this information with traditional inventory methods, as well as the age of the existing inventory (that is, the inventory may not account for changes in stand composition since the information was originally gathered). Understory spruce often contributes to coniferous volumes associated with deciduous-leading stands. I acknowledge these concerns, however, the degree to which the budworm has affected understorey spruce has not been quantified to date, and therefore I do not have sufficient information on which to base any timber supply adjustments.

Slocan Forest Products is concerned that the current outbreak of eastern spruce budworm is creating considerable decline in some spruce stands, and that this is not reflected in the base case. They suggest a monitoring and data gathering process to understand effects and severity of budworm attacks for the next TSR.

Slocan Forest Products also feels that to properly extrapolate what volume has actually been lost, it will be necessary to apply netdown figures for inaccessibility, riparian, and other reserves, inoperability, and forest type. I interpret this to mean that the volume loss figures should recognize that some of the damaged timber is outside of the timber harvesting land base. I acknowledge that there is uncertainty about the proportion of the losses that apply to the timber harvesting land base. However, an attempt was made for the analysis to estimate that proportion for the Fort Nelson TSA, so I believe the licensee's concern has been addressed to the extent possible at this time.

Due to the recent increases in the amount of land base under severe budworm attack District staff believe the base case assumptions underestimate the amount of losses attributable to budworm.

A strategy is currently being developed with the co-operation of the Ministry of Forests (District/Region), Canadian Forest Service (CFS), and the local licensee to better understand the extent and severity of the infestation and develop ideas to control and salvage where possible.

Having reviewed all of the unsalvaged loss estimates and the data and methods used to derive them, I conclude that with the exception of an increase in spruce budworm infestation, the reductions for unsalvaged losses reflect the best information available and are appropriate for this determination.

Based in part on the ratio of the area of spruce-leading stands on the timber harvesting land base to the total forested area in the TSA (5.49%), the time frame over which the budworm attack has been severe (13 years), and an estimate of the mortality rate (32%), the recent increase in severe budworm defoliation (approximately 1 170 402 hectares of gross land base) could translate into 275 880 m^3/year of additional losses on the timber harvesting land base.

This estimate should be interpreted with caution. It is based upon the assumption that the budworm attack will continue in the same magnitude as demonstrated in recent overview surveys. No salvage operations targeting this additional volume are planned at this time.

While the quantity of unsalvaged losses is uncertain, the losses potentially represent a significant downward pressure on coniferous volumes that I will consider further in "Reasons for decision."

Reasons for decision

In reaching my AAC decision for the Fort Nelson TSA, I have considered all of the factors presented above, and I have reasoned as follows.

In determining AACs, my considerations typically identify factors which, considered separately, indicate that the timber supply may actually be either greater or less than that projected in the reference or 'base case' forecast. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of determination. These latter factors are accounted for in determinations in more general terms.

The deciduous and coniferous components of the TSA's inventory present different challenges and opportunities, and consequently the two are considered separately here, as they were in the base case (and have been in previous analyses and determinations).

This determination is complicated by the large uncertainties attendant upon critical factors. Most importantly, many of the significant areas of uncertainty relate to the dated forest cover inventories available for the Fort Nelson TSA.

Coniferous

The coniferous portion of the AAC from the previous (February 1994) determination was 600 000 m^3/year. The coniferous base case timber supply projection from the current analysis – 1 376 000 m^3/year – is considerably higher.

No factors were identified in my considerations that suggested the coniferous timber supply projected in the base case may have underestimated actual timber supply to degrees that may be quantified with a high degree of certainty.

However, the following factor has been identified in my considerations as a reason why the reference forecast may have underestimated coniferous timber supply to a degree that may not be readily quantified:

- *Regeneration delay:* The reference forecast assumes a regeneration delay of 4 years for all coniferous-leading stands. Since some rapid post-harvest planting occurs, the actual regeneration delay is probably less than 4 years on some sites.

I have identified the following factors as indicative of potential overestimations in the coniferous timber supply to degrees that may be quantified with some reliability:

- *Physical and economic operability:* The reference forecast contains an assessment of delivered wood cost based on economics, distance and other related criteria. Further analysis by District staff suggest that an additional approximately 81,000 hectares of coniferous-leading stands included in the base case THLB should not be considered as contributing to the THLB due to isolation and absence of past and planned harvesting activity. I consider this to reduce available coniferous volumes by approximately 200 000 m^3/year.
- *Woodlots:* The THLB used in the base case does not reflect two recently issued woodlots within the TSA. These two woodlots have an AAC of 2000 m^3/year. I estimate that 1600 m^3 of this is attributed to coniferous stands.
- *New protected areas*: An additional approximately 16 800 hectares has been removed from the base case THLB and designated as new parks. This represents a 2.1 percent reduction to the coniferous THLB.
- *Identified wildlife management strategy*: Management for identified wildlife was not incorporated into the base case since no wildlife habitat areas were established in the TSA. However, given the provincial commitment to manage for identified wildlife within a provincial timber supply impact of one percent, I have accounted for a possible one-percent overestimation in the coniferous timber harvesting land base used for the base case.

I have identified the following factors as indicative of potential overestimations in the coniferous timber supply to degrees that currently may not be quantified with accuracy:

- *Low productivity:* Current coniferous harvesting activity has not consistently occurred within stands at the lower end of the base case site index range. The area of coniferous THLB may be overestimated by about 17 percent. Exclusion of these lower productivity stands may represent a reduction to the base case of approximately 200 000 m^3/year over all time frames.

- *Black spruce-leading stands:* Approximately 66 percent of the spruce-leading stands in the TSA are labelled 'S', and included in the base case THLB. However, it is not clear whether they are white spruce (Sw) or black spruce (Sb) stands. Black spruce-leading stands were excluded from the base case forecast, and any of the 'S'-labelled stands that are black spruce should have been excluded as well. There is significant uncertainty about how much of the area labelled as 'S' is black spruce – the upper limit of the associated timber supply contribution is estimated to be about 190 000 m^3.
- *Volume estimates for existing stands:* Estimates from Slocan foresters and from District staff, based on comparisons of cruise and scale volumes to analysis results, suggest coniferous volume estimates for existing stands used in the analysis may overestimate actual harvested volumes by as much as 30 percent. An overestimate of this magnitude could reduce short-term coniferous timber supply by 400 000-500 000 m^3/year. Given the statistical problems of comparing cruise and scale volumes to yield table outputs that apply to a larger land base, the magnitude of the difference is unknown. However, given the magnitude of the observed difference, it appears likely that existing stand volumes have been overestimated to some degree.
- *Eastern spruce budworm:* Recent increases in severe budworm defoliation over approximately 1 170 402 hectares of total forested land base will very likely lead to unsalvaged losses beyond those estimated in the base case. Based on estimates of the types and areas of stands affected, the time over which damage has occurred, and mortality rates, additional losses could be as much as 276 000 m^3/year. However, given the uncertainty about these estimates, the magnitude of the extrapolated increase is highly uncertain. Nevertheless, the increase in budworm attack will most likely lead to an increase in unsalvaged losses above those used in the base case.

Alternate harvest scenarios show that the stock of standing timber in the Fort Nelson TSA has the capacity to absorb some of these downward pressures and still meet the base case timber supply projection in the short term. Still, it is difficult to accept, given the numerous downward pressures discussed here, that a coniferous harvest level approximating the base case could be sustained without risks of future timber supply disruption. In addition, any increase in timber supply in the Fort Nelson TSA would require construction of additional processing infrastructure, which would be economically and socially reasonable only if the extra timber supply were stable and relatively certain.

The Fort Nelson TSA is a very large management unit where future timber supplies depend on a host of complex and uncertain factors. Given its sheer size, the amount of forested area and the relatively small AAC currently allocated to the coniferous land base, it is reasonable to expect that a higher coniferous AAC could be shown to be reasonable at some future date. However, given the findings of this review, particularly the numerous and large uncertainties regarding the forest inventory, I do not believe it can be responsibly asserted at this time that an increase of any specific magnitude is warranted. Investments aimed at improving the quality of the inventory information for this TSA are ongoing. It seems reasonable to me to await completion of this work, and then use it as the basis for future projections thereby removing much uncertainty from the question of whether an increase in the AAC could be reasonably justified for the TSA.

Accordingly, taking all of these factors into account, I believe a reasonable and responsible coniferous harvest level for the Fort Nelson TSA is the current AAC, 600 000 m^3/year.

Deciduous

The base case forecast for deciduous-leading stands is 900,000 m^3/year – the same as the current portion of the AAC attributable to deciduous stands.

The following factor has been identified in my considerations as a reason why the deciduous timber supply projected in the reference forecast may have been underestimated to a degree that may be quantified:

- *Birch-leading stands:* District staff estimate that about 3000 hectares of birch-leading stands (10 percent of the total area of birch-leading stands that are operable and have a site index of 17 or greater) are actually merchantable. This area could contribute approximately 6000 m^3/year to the deciduous timber supply projection. My AAC determination, detailed below, is based upon the contribution of birch volume to the timber supply.

I believe it is also important at this point to note that alternative harvest projections showed the ability to increase short- and medium term harvest levels well above the base case while still achieving all environmental objectives incorporated in the base case. Sensitivity analyses suggest the potential to harvest at 600 000 m^3/year above base case for five decades, followed by a 10 percent rate of decline to the long term harvest level. Again, this implies some capability within the base case forecast to accommodate or absorb downward pressures while still meeting the base case timber supply projection in the short term.

The following factors have been identified in my considerations as reasons why the reference forecast may have underestimated deciduous timber supply to a degree that may not be readily quantified:

- *Low productivity:* Areas were excluded from the THLB if their site indexes were below identified thresholds. Approximately 608 000 hectares of aspen-leading sites were excluded from the THLB because inventories indicated they had site indexes below 17.7 m. A lower aspen site index cutoff would reflect practice in other nearby TSAs, and take into account inventory anomalies (created by the translation of site productivity classes to site index, which resulted in unlikely spikes in the distribution of area among site indexes as outlined earlier in this document). Assessment of the impact of a lower site index threshold on the timber supply forecast suggests that refinement of the site productivity thresholds for deciduous stands to more closely represent actual site productivity could significantly increase projected timber supply compared to the base case. However, I will treat this factor as unquantified until a better understanding of the most appropriate site index threshold is available, which will require both better inventory and monitoring of practices.

- *Regeneration delay:* The reference forecast assumes a regeneration delay of 2 years for all deciduous-leading analysis units. Regeneration delay will likely be 1 year on many deciduous-leading sites.

I have identified the following factors as indicative of potential overestimations in the deciduous timber supply to degrees that may be quantified with some reliability:

- *Physical and economic operability:* The reference forecast contains an assessment of delivered wood cost based on economics, distance and other related criteria. Further consideration by District staff suggest that approximately 18 000 hectares of deciduous-leading stands in the base case THLB should be considered as not contributing due to isolation and absence of past and planned harvesting activity. I consider this to reduce available deciduous volumes by approximately 40 000 m^3/year.
- *Woodlots:* The THLB used in the base case does not reflect two recently issued woodlots within the TSA. These two woodlots have an AAC of 2000 m^3/year. I assume that 400 m^3/year of this is deciduous.
- *New protected areas*: Designation of new protected areas has removed an additional 16 800 hectares (approximately) from the base case THLB. This represents a reduction of 1.8 percent in the deciduous THLB.
- *Identified wildlife management strategy*: Management for identified wildlife was not incorporated into the base case since no wildlife habitat areas were established in the TSA. However, given the provincial commitment to manage for identified wildlife within a provincial timber supply impact of one percent, I have accounted for a possible one-percent overestimation in the deciduous timber harvesting land base used for the base case.

The total upward pressures on the deciduous harvest forecast more than offset the total downward pressures. Additionally, the alternate harvest flows for deciduous stands further illustrate the stability of short-term timber supplies. Still, the downward pressures are largely quantified, and the upward pressures are largely unquantified. Also, uncertainties about the current inventory affect assessment many of these factors.

Better inventory information may show that increasing the deciduous harvest is justifiable, and perhaps even beneficial from a forest management viewpoint. If the deciduous stands really are as old as current inventories suggest, it might be a sound forest management decision to increase the short-term harvest to utilize the volumes before the trees begin to decay and lose merchantable volume. But without better inventory information, I believe any increase in deciduous AAC would be difficult to define and justify at this time. Since available evidence suggests that there should be no difficulty in sustaining harvests at the current level, I determine that the new deciduous AAC for the Fort Nelson TSA should be 900 000 m^3/year.

Determination

Having considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided, it is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, and that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Fort Nelson TSA at this time by establishing an AAC of 1 500 000 cubic metres.

This maintains the AAC for the area, exclusive of all area issued to woodlot licences.

This AAC is made up of two components: a component of 900 000 cubic metres/year attributable to deciduous-leading stands, and a component of 600 000 cubic metres/year attributable to coniferous-leading stands.

A number of ongoing activities promise emerging solutions to dealing with uncertainties have been noted in this rationale. The three primary ones are:

- inventory
- mixedwood strategy
- budworm infestation

Improved inventories have been mentioned numerous times throughout this document. The current forest inventory ranges in vintage from 1970 to 1989 (30 to 11 years old), and some is interpreted from photos from the 1950s. I place great urgency in completing updated inventories for the Fort Nelson TSA. I hope that these updated inventories will be available for the next AAC determination.

Mixedwood stands form a substantial component of the timber harvesting land base. Currently 33.5 percent of the timber harvesting land base is comprised of these mixedwood stands. There is some uncertainty surrounding the accuracy of these numbers due to the vintage of the inventory and the standard to which it was collected. Mixedwood stands in this TSA have significant wildlife and biodiversity values. District management strategies for mixedwood stands are currently under development.

Recent spruce budworm overview mapping has indicated a significant increase in the amount of spruce budworm defoliation. With the increase of the spruce budworm infestation in the TSA, understory spruce has been affected to a currently unquantified extent. Plantations have been impacted as well. A strategy is currently being developed with the co-operation of the Ministry of Forests (District/Region), Canadian Forest Service (CFS), and the local licensee to better understand the extent, severity and successional implications of the budworm infestation, to and develop approaches for control and salvage where possible.

These ongoing activities and emerging solutions should bring clarity to some great uncertainties associated with this determination. Should they come to conclusion, and if consequent substantial timber supply implications are indicated, I will, if appropriate, review the Fort Nelson TSA AAC again at an earlier date than required by statute.

This determination is effective September 1, 2001, and will remain in effect until a new AAC is determined, which must take place within five years of the date of this determination.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important in helping to reduce the risk and uncertainty associated with key factors that affect the timber supply in the TSA.

- Ministry of Forests staff should continue to work with Slocan Forest Products in implementing the five-year re-inventory plan.
- District staff should establish operability mapping for the TSA to refine estimates of physical and economic operability for the TSA.
- Site index cut offs for all commercial species should be re-examined to better define exclusions for unmerchantable forest types.
- Staff from Ministry of Forests district, region and branch and the Ministry of Environment, Lands and Parks, in conjunction with the licensee and other interested parties, should continue their development of mixedwood management strategies.
- This AAC is premised on contributions of lodgepole pine-leading stands in approximate proportion to their contribution to the timber harvesting land base of the TSA. The contribution of lodgepole pine-leading stands to harvests in the Fort Nelson TSA should be assessed during the term of this determination, and contribution of these stands to future AACs should be based in part on the rate and nature of their utilization.
- The potential contribution of the Cassiar addition to timber supply should be investigated.
- Ministry staff and the licensee should work to explain and reduce discrepancies between stand volumes estimated by VDYP, and those measured in the field (cruises) or during scaling.
- Ministry staff, in conjunction with the licensee, should monitor any stand conversion from predominantly coniferous to deciduous, deciduous to coniferous, pure to mixed species and mixed to pure species stands as a result of forest management activities.

- Ministry staff should assess the existing stream and riparian studies, and if necessary revise them, to ensure riparian areas are appropriately represented in the next analysis and determination
- Minimum harvestable age estimation for aspen should be reviewed to ensure that the analysis reflects reasonable economic and biological thresholds.
- Management for stand-level biodiversity should be monitored so that better information on levels of wildlife-tree retention in the timber harvesting land base will be available for future determinations.
- Ministry of Forests and Ministry of Environment, Lands and Parks staff should continue to work co-operatively to establish WHAs to clarify management for, and ensure protection, of identified wildlife.
- District staff should pursue funding for continuation of non-commercial brush rehabilitation. The amount of rehabilitation should be monitored to ensure the appropriate areas are included in future timber supply analyses.
- Ministry of Forests staff (District/Region), together with the Canadian Forest Service and the local licensee should continue to develop a strategy to better understand the extent, severity and successional implications of the budworm infestation, and to develop strategies for control and salvage where possible.

L. Ped

Larry Pedersen
Chief Forester

May 23, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1999, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and
(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
(b) different types of timber and terrain in different parts of private land within a tree farm licence area.
(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.

(7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, in accordance with

(a) the community forest agreement, and
(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,
(ii) the expected time that it will take the forest to become re-established on the area following denudation,
(iii) silviculture treatments to be applied to the area,
(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Information

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Fort Nelson Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests
Fort Nelson Forest District
RR #1, Mile 301, Alaska Highway
Fort Nelson, BC
V0C 1R0

May, 2001

This is a summary of the public input received on the Timber Supply Review in the Fort Nelson Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Background

As part of the review of timber supply in the Fort Nelson Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Fort Nelson TSA *Data Package* and *Information Report* in July 1997. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Fort Nelson TSA. A 30-day review period, ending August 25, 1997, was provided for the public to comment on these documents.

On March 16, 2000, the British Columbia Forest Service released the *2000 Fort Nelson TSA Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended May 15, 2000.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Fort Nelson TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the Freedom of Information and Protection of Privacy Act) can be reviewed at the Fort Nelson Forest District office.

Public Review Process and Response

Fort Nelson District staff actively solicited public input on the Timber Supply Review in the Fort Nelson TSA through the following actions:

- copies of the Information Report were mailed to 32 stakeholders, interest groups and individuals in the Fort Nelson TSA or adjacent timber supply areas. Copies were also mailed to the Kaska Dene Council, Dene Keepers of the Earth, Treaty 8 Tribal Association, and Fort Nelson, Dene Tha, Fort Liard, Lower Post and Prophet River First Nations.
- copies of the *Data Package* were mailed to the forest licensee (Slocan Forest Products) and to the Fort Nelson, Dene Tha, Fort Liard, Kaska Dene and Prophet River First Nations.
- copies of the *Fort Nelson TSA Analysis Report* and *Public Discussion Paper* were mailed or provided to Slocan Forest Products, Fort Nelson Town Council, the Northern Rockies Regional District, and the Fort Nelson, Dene Tha, Fort Liard, Kaska Dene and Prophet River First Nations.
- the *Data Package* and the *Fort Nelson TSA Analysis Report* were also available at the forest district office in Fort Nelson and about six copies of each were picked up.
- meetings regarding both the *Data Package* and *Analysis Report* were held with representatives from local government and the Land and Resource Management Plan (LRMP) Working Group.
- district staff responded to a number of phone calls and held informal meetings with interested individuals and the forest industry to explain the information in the reports and to answer specific questions.

- an offer to present or discuss the *Data Package* and the *Analysis Report* was made to all First Nations with interests in the Fort Nelson TSA.
- the local newspaper was provided with news releases and published stories on the Timber Supply Review in the Fort Nelson TSA.

The Fort Nelson Forest District received nine written submissions on the *Data Package* and seven submissions on the *Analysis Report* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Fort Nelson TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments

Data Package

Land Base Factors

Slocan Forest Products Ltd. (SFP) raises a number of concerns about the definition of the operable land base, noting that economic viability fluctuates with markets and access development, and is determined as much by the log profile as by species, volume per hectare or distance to the mill. SFP also says that areas considered uneconomic today may not be so tomorrow and should not be removed from the timber harvesting land base (THLB). The company requests full industry consultation on the determination of the criteria used to define the operable land base.

The Fort Nelson-Liard Regional District (now the Northern Rockies Regional District) questions whether the forest industry is involved in the determination of economic operability. The Regional District also expresses support for the initiative to harvest birch, while the Ministry of Environment, Lands and Parks (MELP) questions the legitimacy of including birch in the THLB when there is not yet any commercial utilization of this species.

With regard to mixedwood stands, SFP says that due to uncertainty in the inventory data (e.g., misidentification of coniferous types), it's essential that more optimistic options be selected when determining the criteria for including or excluding mixedwood stands in the harvesting land base. MELP notes uncertainty about what percentage of the spruce types are black spruce, and says if it is 5% or more, this issue must be considered in this timber supply review.

SFP questions the criteria used to define low productivity sites, saying the minimum site indices, heights and volumes per hectare are too high. The company provides comparisons with other forest districts where these minimum criteria are higher and cruise information that shows how much area that falls below the minimum guidelines has been harvested by SFP.

The Regional District questions whether, given the current provincial guidelines, future resource road construction will be discouraged and how that might affect resources that may be deemed uneconomical or inaccessible due to lack of infrastructure. SFP says that Fort Nelson district policy requires reforestation of all temporary roads and landings when harvesting is complete, and therefore these areas should not be removed from the THLB.

The Regional District requests further information on the process used to determine the effects of future seismic activity on the harvesting land base and harvest levels, and conversely how seismic activity will be facilitated within the THLB.

SFP expresses the opinion that it's unreasonable to exclude all seismic areas from the harvesting land base. The company says seismic areas within a harvesting area must be reforested and a review of older seismic lines indicates a large amount of naturally regenerated lines contributing to the THLB. SFP is also of the opinion that a large percentage of the 4334 hectares of forested area lost to oil and gas exploration since 1994 is on low sites and in unmerchantable forest types, and therefore a careful examination of types is needed before removing this area from the THLB. SFP notes its understanding that no further deductions will be made for future seismic exploration.

The Regional District expresses support for a sensitivity analysis on protected areas and requests the opportunity to provide input. The Regional District also questions how the potential reversion of the Canadian Chopstick Manufacturing Co. (CCMC) forest licence is reflected in the timber supply review.

Inventory Factors

SFP notes the need for a complete re-inventory of the Fort Nelson TSA and says now that it is policy to manage for the coniferous understory in mixedwood stands, it must be included in the inventory analysis. The Regional District says it is aware that the current timber supply may be underestimated due to the outdated inventory and questions whether the timber supply review will proceed if a new inventory is not completed before the timber supply analysis is done.

The Fort Nelson First Nation refers to a statement in the *Information Report* regarding the district's work on archaeological inventories and the development of management strategies, and requests clarification on how the Ministry of Forests has involved the First Nation.

Expected Rate of Growth and Productivity

SFP notes that the current growth models grow aspen with no succession to coniferous types, which does not reflect reality. The company says it is important to analyze the transition from aspen-spruce to spruce-aspen, and suggests using the Mixedwood Growth Model from Alberta to model growth in managed deciduous stands. SFP makes other recommendations on which timber supply models should be used to project the growth of established and future stands.

SFP questions the minimum harvestable age used for aspen (81 years) and says that 61 years is more appropriate as many aspen reach maximum growth then, or earlier. The company says if product requirements are used to drive minimum harvestable age, then a sensitivity analysis is needed to assess the implication of using the age at which maximum growth occurs.

Not Satisfactorily Restocked Areas

The Regional District says that about 9500 hectares are scheduled to be restocked over the next 10 years, and since the TSR covers five years, the District questions how this will be reflected in the analysis. SFP says that the 2500 hectares with regeneration problems should remain in the THLB, since these areas may be restocked using alternate methods. The company notes that Forest Renewal BC targets these types of areas for rehabilitation, and says it is reasonable to expect rehabilitation would occur in the next five to 10 years.

Silvicultural Systems

SFP notes that methods other than clearcutting are used in this TSA (e.g., clearcut with reserves and understory protection in deciduous-leading stands). The company says a precise definition of "original forests" is needed immediately and questions whether the requirement to use silvicultural tools to maintain original forests applies to coniferous and deciduous stands, or just to mixedwood stands.

Riparian and Visually Sensitive Areas

SFP requests further information on how the reductions for riparian values were achieved, and notes that operating regulations require a 10-metre reserve (not 30-metre as in the *Data Package*) on lakes larger than five hectares unless the district manager directs otherwise. To the company's knowledge, this has not occurred.

MELP asks for information about deductions for Riparian Management Zones, noting that in the first timber supply review in other TSAs, deductions varied based primarily on timber type. MELP notes recent discussions about management of active floodplains along large rivers and says they favour the application of guidelines in the *Riparian Management Area Guidebook* that require 70-100% retention of forests in these areas. MELP says many floodplains have been severely overharvested in the Fort Nelson TSA with high impacts on wildlife and fisheries.

SFP says a five-metre green-up for visual quality is not current practice and that visual quality objectives should not be part of the base case timber supply forecast, since none have been established.

Environmentally Sensitive Areas

SFP notes that all environmentally sensitive areas have been removed from the THLB, whereas in other TSAs only those with high value or sensitivity are removed entirely (i.e., ESA1 areas). The company says areas with moderate regeneration problems should not be removed from the harvesting land base, as SFP and others routinely harvest and reforest these sites. SFP requests a clarification of the criteria used to remove areas of moderate wildlife significance for caribou and goat habitat from the THLB.

Non-Recoverable Losses

SFP says that to properly estimate volumes lost to fire, netdown figures for inaccessibility, forest type, inoperability, and riparian and other reserves must be applied. Similarly, the company says volume lost to insects and disease must be modified to accurately depict operability.

Timber Supply Area Analysis Report

Land Base Factors

SFP says the analysis is overly conservative in assuming that areas of aspen with a site index of 17.7 metres or less should be removed from the THLB due to low productivity. The company says the assumption that after fires, these areas will not contribute to the harvestable land base is not supported by their observations. In their submission, the Northern Rockies Regional District and Town of Fort Nelson say they are unclear how much of the timber from low productivity sites could actually be utilized.

The MELP submission questions the inclusion of mixedwood stands in the THLB since the past harvest level has been very low and a management strategy for these types has not been finalized. MELP notes that these types have significant wildlife and biodiversity values, and recommends they either be removed from the THLB or considered for a partitioned cut, contingent on a management strategy that meets all resource objectives.

The Fort Nelson First Nation says that interest in harvesting birch does not take into account First Nations' traditional use. This submission also says the enlargement of the Fort Nelson TSA does not mitigate the forestry disturbance that is currently infringing on Treaty 8 rights and should not be used to justify an increase in harvesting.

The MELP submission requests clarification on how seismic exploration and development is factored into estimates of timber supply. For example, MELP asks if the volume harvested on seismic lines is part of the AAC and if seismic cuts are required to be reforested and, if so, do they then return to the THLB. With regard to future logging roads, MELP notes that 5% of the THLB will be harvested and then kept permanently in an early seral stage (i.e., bare ground). MELP says the removal of this land from the THLB means it no longer forms part of the calculations for biodiversity constraints, even though the area has been permanently removed as habitat.

SFP recommends establishment of a rehabilitation program to reforest some of the non-commercial brush areas currently removed from the THLB. The company believes this could produce an increase in the AAC.

Forest Inventory Factors

Four submissions comment on the need for a more accurate inventory in the Fort Nelson TSA, particularly with regard to the extent of mixedwood types and the need to distinguish black spruce from white spruce stands. SFP estimates, for example, that the base case forecast is overstated by 190 000 cubic metres per year as a result of inaccurate spruce typing.

The Regional District expresses concern about the reliability of projections in the timber supply analysis due to poor basic inventory information and is of the opinion that the new inventory work that is underway is not to the extent necessary. They question the possible negative effect of old inventory classifications, particularly with reference to aspen.

The MELP submission says spruce forests often include relatively large wetlands and other non-forested sites that were not recorded in the old inventory. MELP is of the opinion that riparian exclusions are insufficient to account for in-stand wetlands.

Expected Rate of Growth and Volume Estimates

The Regional District submission notes the difference between projected volumes in the timber supply analysis and SFP's reported actual average harvest. The Regional District says the large discrepancy raises doubt about the accuracy of volume projections.

SFP says that while analysis results indicate an average harvested volume of 300 cubic metres per hectare for deciduous forests, SFP's actual average harvest is 325 cubic metres per hectare. The company says this means the AAC could be increased by about 10%. Conversely, in SFP's opinion, the volumes estimated for unmanaged coniferous stands are very optimistic. The company compares the analysis result of 350 cubic metres per hectare with their average volume of 225 cubic metres per hectare. Using the latter figure would reduce the base case forecast by about 488 000 cubic metres per year, according to SFP.

SFP says the current outbreak of eastern spruce budworm is creating considerable decline in some spruce stands and this is not reflected in the base case analysis. The company suggests a monitoring process to understand the effects and severity of budworm attacks for the next timber supply review.

Biodiversity and Old Growth

SFP says on-the-ground identification of Old Growth Management Areas (OGMAs) and other such features in some landscape units will affect the THLB and result in an AAC reduction of 3-5%. MELP expresses the opinion that there appears to be enough timber in the Fort Nelson TSA to comply with full biodiversity requirements without any effect on harvest levels and suggests modeling this approach, rather than the standard 45/45/10 (low/medium/high biodiversity emphasis).

MELP notes that the timber supply model grows the timber in the non-contributing land base without allowing for any natural disturbance, and says this is an incorrect assumption given fire return intervals of 100 to 125 years in this TSA. As well, MELP says trends in global warming indicate the northern interior is warming at a rate three times the global average and this will increase the risk of fire events.

Wildlife

The Fort Nelson First Nation notes that if furbearers are at moderate risk due to roads, then the Treaty 8 right to trap must be also and this concern must be addressed. The First Nation disagrees with the statement in the *Analysis Report* that "virtually no open-roaded access presently exists in the TSA" since forestry and oil and gas companies use all-weather and fair-weather roads.

Riparian and Green-up Requirements

The Fort Nelson First Nation notes that areas along rivers more than 100 metres wide, which are important for hunting, trapping, gathering and other traditional use activities, are not required to have reserves. MELP says that since the early 1970s harvesting has been concentrated in forests along river corridors and floodplains, to the detriment of wildlife and biodiversity management. Now that river corridors are Special Management Areas within the LRMP and a different management regime in the future is expected, MELP says this may impact timber production, as may changes in the application of the federal *Fisheries Act* to floodplains.

MELP expresses concern that allowing 39% of the timber harvesting land base in a landscape unit below green-up may result in hydrological problems where the timber harvesting land base makes up a large portion of the total forest area.

Implications of Alternative Harvest Rates

MELP says that without a thorough environmental analysis, it's difficult for the chief forester to evaluate the short- and long-term environmental implications of the dramatic increase in timber supply and decrease in average harvested age proposed by the *Analysis Report*.

Socio-Economic Impacts

The submission from the IWA-Local 1-424 expresses concern with the recent downward trend in employment. The union says SFP at one time employed many more people under their current licence and expresses the opinion that SFP has not created jobs in their plywood plant but has only replaced jobs eliminated by downsizing their sawmill.

Omineca Enterprises says that contrary to the socio-economic analysis, they have a sawmill and a 11 500 cubic metre per year coniferous forest licence.

The Regional District submission states their opposition to any movement of timber outside the region, saying that wood harvested in the Fort Nelson TSA must be processed in the TSA so that economic benefits remain in the region. The District supports attracting a second company to the region, particularly one that creates a higher value product such as CCMC produced. The Fort Nelson Regional Economic Task Force agrees with the desirability of additional value-added manufacturing capacity in the TSA and suggests a study to research innovative transportation partnerships to offset high transportation costs.

Other Comments

Many submissions commented on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

The Northern Rockies Regional District submission reminds the ministry of forests that a role of local government in economic development is to project, promote and prepare for "what ifs" in a five-year period and therefore the ministry should ensure that the timber supply review includes all vital information.

SFP suggests that the timber supply review should be based on species as opposed to land base. The company says this would simplify cut control and forest management. Both SFP and the Regional District question if other timber supply models should be used to more accurately reflect the growth and dynamics of mixedwood forests and raise confidence in timber supply projections.

Omineca Enterprises says their history and current status must be recognized and their rights dealt with before the timber supply review can fairly proceed. The company maintains they continue to have cutting rights under two old licences (TSHLs), and have applied to have those rights reinstated under a forest licence.

The submission from the Fort Nelson First Nation notes there is very little reference to them and Treaty 8 in the *Analysis Report*, nor is there any evaluation of the current AAC's impact on the level of infringement on Treaty 8 rights. The First Nation reminds the ministry of forests that they do not have the capacity to review current forestry activities, let alone increased harvesting.

Harvest Levels

Several submissions comment on the level at which the AAC should be set. The IWA expresses support for the forecasted increase in harvests and the opportunity to increase forest industry employment. The Economic Task Force says no radical changes should occur without consideration for socio-economic impacts and MELP says the current AACs appear to be well within sustainable limits, in spite of uncertainties and inaccuracies in the old inventory.

The Regional District notes that the analysis shows an opportunity to increase the AAC (even if not to the base case level) which they support if it is based on good science and if the level of confidence in the projections is high. The Regional District supports an increased AAC as a means of economic diversification but believes a prudent approach is needed given the variety of unknown factors.

SFP says the deciduous cut level should be set conservatively but that a 10-15% increase would be well-justified due to underestimates of deciduous volumes in the analysis, the high quality of aspen stands in the Fort Nelson TSA, and the need to include after-fire aspen stands in the harvesting land base. The company says the coniferous harvest level should not be increased by more than 10%, due to overestimates of coniferous volumes in the analysis, the low accuracy of inventory information, the impact of meeting landscape unit objectives, and the impact of the spruce budworm.

The Fort Nelson First Nation provides a number of reasons why they believe the AAC should not be increased. These include uncertainties around inventory data, future growth and productivity, and management practices in mixedwood stands. The First Nation expresses concern about the increased infringement on Treaty 8 rights and the projected elimination of older forests.

Submissions received by the Fort Nelson Forest District

Submissions received on the Data Package

First Nations
Fort Nelson First Nation

Government agencies
Ministry of Environment, Lands and Parks, Regional Habitat Section

Industry
Slocan Forest Products Ltd. (3 submissions)
Omineca Enterprises

Local government
Fort Nelson-Liard Regional District (3 submissions)

Submissions received on the Timber Supply Analysis Report

First Nations
Fort Nelson First Nation

Government agencies
Ministry of Environment, Lands and Parks, Regional Habitat Section

Industry
Slocan Forest Products Ltd.
IWA Canada, Local 1-424
Omineca Enterprises Ltd.

Local government
Northern Rockies Regional District & Town of Fort Nelson

Interest groups
Fort Nelson Regional Economic Task Force